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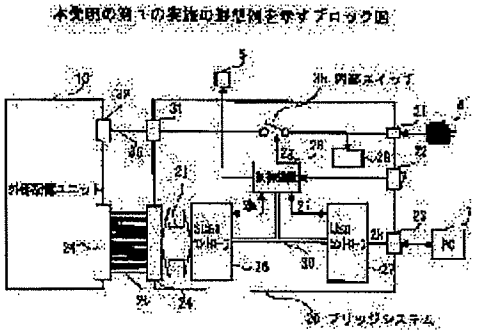
(54) POWER CONTROL CIRCUIT OF EXTERNAL STORAGE DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a power control circuit of an external storage device which can turn off the electric power after securely writing data to an external storage unit.
SOLUTION: This circuit is equipped with an external storage unit 10 which stores data, a 1st interface which is connected to the external storage unit 10, a 2nd interface for connection with external equipment, a device which performs conversion between the data formats of the 1st and 2nd interfaces, a controller 28 which controls the operation of the whole circuit, an internal switch 35 for supplying the electric power to the external storage unit 10, and an external switch 22 for supplying a power-ON signal; and the controller 28 issues, when it is turned ON, some command to the 1st interface once detecting the external switch 22 being turned on and releases the internal switch 35 when a specific response is sent back from the external storage unit 10, thereby turning off the power source.



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1 **POWER CONTROL CIRCUIT OF EXTERNAL STORAGE DEVICE**

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EC:

IPC: ***G06F1/26; G06F1/32; G06F3/06*** (+9)

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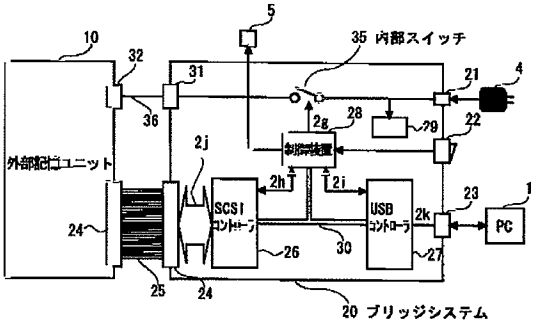
(54)【発明の名称】　外部記憶装置の電源制御回路

(57)【要約】
【課題】　本発明は外部記憶装置の電源制御回路に関し、外部記憶ユニットに確実にデータを書き込んでから電源をオフにすることができる外部記憶装置の電源制御回路を提供することを目的としている。
【解決手段】　データを記憶する外部記憶ユニット１０と、該外部記憶ユニット１０と接続される第１のインタフェースと、外部機器と接続するための第２のインタフェースと、該第１のインタフェースと第２のインタフェースのデータ形式の変換を行なう装置と、全体の動作を制御する制御装置２８と、前記外部記憶ユニット１０に電源を供給するための内部スイッチ３５と、電源のオンオフ信号を与える外部スイッチ２２とを具備し、前記制御装置２８は電源オンの時、前記外部スイッチ２２が押されたことを検出すると、第１のインタフェースにあるコマンドを発行し、特定のレスポンスが外部記憶ユニット１０から返ってきたら前記内部スイッチ３５を解放して電源をオフにするように構成する。

本発明の第１の実施の形態例を示すブロック図



【特許請求の範囲】
【請求項１】　データを記憶する外部記憶ユニットと、該外部記憶ユニットと接続される第１のインタフェースと、
外部機器と接続するための第２のインタフェースと、
該第１のインタフェースと第２のインタフェースのデータ形式の変換を行なう装置と、
全体の動作を制御する制御装置と、
前記外部記憶ユニットに電源を供給するための内部スイッチと、
電源のオンオフ信号を与える外部スイッチとを具備し、前記制御装置は電源オンの時、前記外部スイッチが押されたことを検出すると、第１のインタフェースにあるコマンドを発行し、特定のレスポンスが外部記憶ユニットから返ってきたら前記内部スイッチを解放して電源をオフにすることを特徴とする外部記憶装置の電源制御回路。
【請求項２】　前記制御装置は電源オンの時、前記外部スイッチが押されたことを検出すると、前記第２のインタフェースから前記外部記憶ユニットに対するコマンド或いはデータが無いのを一定時間確認し、一定時間無い時には前記第１のインタフェースにあるコマンドを発行し、特定のレスポンスが外部記憶ユニットから返ってきたら前記内部スイッチを解放して電源をオフにすることを特徴とする請求項１記載の外部記憶装置の電源制御回路。
【請求項３】　前記第２のインタフェースから前記外部記憶ユニットに対するコマンドが一定時間無い場合には、前記内部スイッチを解放して電源をオフにすることを特徴とする請求項１乃至２の何れかに記載の外部記憶装置の電源制御回路。
【請求項４】　前記外部記憶ユニットはリムーバブルメディア・ドライブユニットであり、該メディアが外部記憶ユニットに入っていない状態が一定時間経過した時は、前記内部スイッチを解放して電源をオフにすることを特徴とする請求項１乃至３の何れかに記載の外部記憶装置の電源制御回路。
【請求項５】　時刻を計る計時手段を具備し、決まった時間になると電源をオンにしたりオフにしたりすることを特徴とする請求項１乃至４の何れかに記載の外部記憶装置の電源制御回路。
【請求項６】　電源オンの時、前記外部スイッチが押された時に前記第１のインタフェースにあるコマンドを発行し、特定のレスポンスが前記外部記憶ユニットから返ってきたら電源をオフにするか、外部スイッチが押されたらすぐに電源をオフにするかの選択を前記第２のインタフェースを介して指示できることを特徴とする請求項１記載の外部記憶装置の電源制御回路。
【請求項７】　電源オンの時、前記外部スイッチが押された時に前記第２のインタフェースから前記外部記憶ユニットに対するコマンドが無いのを一定時間確認し、一定時間無い時には前記第１のインタフェースにあるコマンドを発行し、特定のレスポンスが外部記憶ユニットから返ってきたら電源をオフにするか、外部スイッチが押されたらすぐに電源をオフにするかの選択を第２のインタフェースを介して指示できることを特徴とする請求項２記載の外部記憶装置の電源制御回路。
【請求項８】　前記第２のインタフェースから前記外部記憶ユニットに対する要求が一定時間無い時には、電源をオフにするかどうかの選択を第２のインタフェースを介して指示できることを特徴とする請求項３記載の外部記憶装置の電源制御回路。
【請求項９】　前記外部記憶ユニットはリムーバブルメディア・ドライブユニットであり、該メディアが外部記憶ユニットに入っていない状態が一定時間経過した時は、電源をオフにするかどうかの選択を前記第２のインタフェースを介して指示できることを特徴とする請求項４記載の外部記憶装置の電源制御回路。
【請求項１０】　決まった時間の設定を前記第２のインタフェースを介して指示できることを特徴とする請求項５記載の外部記憶装置の電源制御回路。
【請求項１１】　電源オンの時、前記外部スイッチが押された時に、前記制御装置は、第２のインタフェースを通じて外部装置に通知し、該外部装置の指示で電源をオフにすることを特徴とする請求項１記載の外部記憶装置の電源制御回路。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は外部記憶装置の電源制御回路に関し、更に詳しくはパーソナルコンピュータ（以下パソコン又はＰＣと略す）等の外付け記憶装置の電源制御回路に関する。
【０００２】
【従来の技術】ＵＳＢ、ＩＥＥＥ１３９４といったモダンなインタフェースを持つＭＯ（光磁気ディスク装置）、ＨＤＤ（固定ディスク装置）、ＣＤ－Ｒ／Ｗといったパソコンの外部記憶装置が盛んに登場している。図１０はパソコンと外部記憶装置を示す図である。図において、１はパソコンであり、ＵＳＢケーブル３を介して外部記憶装置２と接続されている。
【０００３】これらの外部記憶装置の多くは既存のＡＴＡＰＩ、ＳＣＳＩといったインタフェースを持つ外部記憶ユニット（いわゆる内蔵型ＭＯドライブ、ＨＤＤ、ＣＤ－Ｒ／Ｗ）にブリッジシステムを付加しているものが多い。その理由は、以下の通りである。
【０００４】① 新規インタフェースを持った外部記憶ユニットの開発、量産には莫大な費用と期間を要する。② 新規インタフェースのどれが主流となるのか現時点では決められない。
【０００５】以上のような理由から、ＡＴＡＰＩ、ＳＣ

ＳＩをＵＳＢ、ＩＥＥＥ１３９４等に変換するブリッジシステムを開発し、又は購入し、これを外付けする方がメリットが多いためである。

【０００６】図１１はＵＳＢ又はＩＥＥＥ１３９４インタフェース付外部記憶装置の外観構成例を示す図である。従来の外部記憶ユニット１０にブリッジシステム２０を付加することで従来の外部記憶ユニット１０を利用可能にしている。ブリッジシステム２０は、基板に各種の必要部品を取り付けることにより実現している。ブリッジシステム２０において、２１は電源ジャック、２２は電源スイッチ、２３はＵＳＢ、ＩＥＥＥ１３９４等のコネクタ、２４はＳＣＳＩ、ＡＴＡＰＩ等のインタフェースであり、ブリッジシステム２０と接続されている。このように、ブリッジシステムを設けることで、既存のＳＣＳＩ、ＡＴＡＰＩインタフェースを利用した記憶ユニットをＵＳＢ、ＩＥＥＥ１３９４対応の記憶装置として利用することができる。

【０００７】パソコンの高速化とインタフェースの高速化に伴い、外部記憶ユニットの高速化も望まれる。そこで、ＭＯ、ＨＤＤ、ＣＤ－Ｒ／Ｗよりアクセスの速いキャッシュと呼ばれる高速な半導体メモリを積んで転送されるデータを一時ここに貯めることで、外部記憶装置としてのアクセスを見かけ上速くして、パソコンを早く解放することができる。

【０００８】図１２はＵＳＢ又はＩＥＥＥ１３９４インタフェース付き外部記憶装置の従来構成例を示すブロック図である。図１０と同一のものは、同一の符号を付して示す。外部記憶ユニット１０とブリッジシステム２０とがケーブル２５を介して接続されている。２４はケーブル２５が接続されるＳＣＳＩインタフェースである。

【０００９】ブリッジシステム２０において、２６はＳＣＳＩコントローラ（第１インタフェースコントローラ）、２７は該ＳＣＳＩコントローラ２６と接続されるＵＳＢコントローラ（第２インタフェースコントローラ）である。２８はＳＣＳＩコントローラ２６とＵＳＢコントローラ２７間をデータバス３０を介して接続する制御装置である。該制御装置２８としては、例えばＣＰＵが用いられる。

【００１０】２ｊは、ＳＣＳＩコントローラ２６とＳＣＳＩインタフェース２４間を流れる第１インタフェース信号である。１はパソコンで、ＵＳＢコネクタ２３と接続されている。２ｋはＵＳＢコントローラ２７とＵＳＢコネクタ２３間に流れる第２インタフェース信号である。

【００１１】４は電源、２１は該電源４が接続される電源ジャックである。該電源ジャック２１から入力される電源は、電源スイッチ２２を介してブリッジシステム内部に供給される。２９は、ブリッジ用電源である。該電源２９からブリッジシステム２０を動作させるためのパワーが供給される。電源は、コネクタ３１とコネクタ３２と電源供給ライン３６を介して外部記憶ユニット１０側にも供給される。

【００１２】このように構成された装置において、制御装置２８は第１インタフェース用制御信号２ｈ、及び第２インタフェース用制御信号２ｉとデータバス３０を介してＵＳＢインタフェースとＳＣＳＩインタフェース間の相互変換を行なう。これにより、パソコン１からのデータは、ＵＳＢコントローラ２７からブリッジシステム２０に入り、ＳＣＳＩインタフェース用データに変換され、外部記憶ユニット１０に書き込まれる。つまり、従来のＳＣＳＩインタフェースを用いた外部記憶ユニット１０にＵＳＢインタフェースを使用してデータを読み書きすることが可能になる。

【００１３】

【発明が解決しようとする課題】ＵＳＢ、ＩＥＥＥ１３９４は、ホットプラグ機能（使用しない時には電源をオフにしておくことができる機能）があり、機器を使用しない時にはいつでも電源を切ることができる。ところが、前記キャッシュを持った外部記憶ユニットは、パソコン１から大きなファイルをコピーした時、全てのファイル転送がキャッシュに貯まった分を含めて完了すると、パソコン１にコピー完了を通知する。

【００１４】パソコン１は、画面上にダイアログ等を表示又は非表示等してユーザにコピーが終了したことを知らせる。しかしながら、実際にはキャッシュにストックされただけで実際には書き込み作業が完了していないこともあり、この時に電源をオフにされるとキャッシュに貯まった書き残しデータが消えてしまう。

【００１５】このような事故を防ぐために特開平８－９５７１５号公報記載の技術がある。しかしながら、この発明では外部記憶ユニット１０にもビジー告知手段を必要とする。そのため、前記既存の外部記憶ユニット１０にブリッジシステムを付けた外部記憶ユニットには適用できないという問題がある。

【００１６】本発明はこのような課題に鑑みてなされたものであって、既存の外部記憶ユニットに確実にデータを書き込んでから電源をオフにすることができる外部記憶装置の電源制御回路を提供することを目的としている。

【００１７】

【課題を解決するための手段】（１）請求項１記載の発明は、データを記憶する外部記憶ユニットと、該外部記憶ユニットと接続される第１のインタフェースと、外部機器と接続するための第２のインタフェースと、該第１のインタフェースと第２のインタフェースのデータ形式の変換を行なう装置と、全体の動作を制御する制御装置と、前記外部記憶ユニットに電源を供給するための内部スイッチと、電源のオンオフ信号を与える外部スイッチとを具備し、前記制御装置は電源オンの時、前記外部スイッチが押されたことを検出すると、第１のインタフェ

ースにあるコマンドを発行し、特定のレスポンスが外部記憶ユニットから返ってきたら前記内部スイッチを解放して電源をオフにすることを特徴とする。

【００１８】このように構成すれば、外部記憶ユニットに全てのデータが書き込まれた時に、外部記憶ユニットから返ってくる特定のレスポンスを受けると、電源をオフにするので、外部記憶ユニットに確実にデータを書き込んでから電源をオフにすることができる。

【００１９】（２）請求項２記載の発明は、前記制御装置は電源オンの時、前記外部スイッチが押されたことを検出すると、前記第２のインタフェースから前記外部記憶ユニットに対するコマンド或いはデータが無いのを一定時間確認し、一定時間無い時には前記第１のインタフェースにあるコマンドを発行し、特定のレスポンスが外部記憶ユニットから返ってきたら前記内部スイッチを解放して電源をオフにすることを特徴とする。

【００２０】このように構成すれば、第２のインタフェースから前記外部記憶ユニットに対するコマンドが一定時間無い場合に、外部記憶ユニットに全てのデータが書き込まれた時に、外部ユニットから返ってくる特定のレスポンスを受けると、電源をオフにするので、外部記憶ユニットにパソコンが送る全てのデータを確実に書き込んでから電源をオフにすることができる。

【００２１】（３）請求項３記載の発明は、前記第２のインタフェースから前記外部記憶ユニットに対するコマンドが一定時間無い場合には、前記内部スイッチを解放して電源をオフにすることを特徴とする。

【００２２】このように構成すれば、第２のインタフェースから外部記憶ユニットに対する要求が一定時間無い場合には、電源をオフにして、外部記憶ユニットの無駄な電力消費を抑えることができる。

【００２３】（４）請求項４記載の発明は、前記外部記憶ユニットはリムーバブルメディア・ドライブユニットであり、該メディアが外部記憶ユニットに入っていない状態が一定時間経過した時は、前記内部スイッチを解放して電源をオフにすることを特徴とする。

【００２４】このように構成すれば、リムーバブルメディアが外部記憶ユニットに入っていない状態が一定時間続く時には電源をオフにすることにより、外部記憶ユニットの無駄な電力消費を抑えることができる。

【００２５】（５）請求項５記載の発明は、時刻を計る計時手段を具備し、決まった時間になると電源をオンにしたりオフにしたりすることを特徴とする。このように構成すれば、パソコンのバックアッププログラムと連携し、自動バックアップを行なうことができる。

【００２６】（６）請求項６記載の発明は、電源オンの時、前記外部スイッチが押された時に前記第１のインタフェースにあるコマンドを発行し、特定のレスポンスが前記外部記憶ユニットから返ってきたら電源をオフにするか、外部スイッチが押されたらすぐに電源をオフにするかの選択を前記第２のインタフェースを介して指示できることを特徴とする。

【００２７】このように構成すれば、外部記憶ユニットから特定のレスポンスが返ってきてから電源をオフにするか、或いは外部スイッチが押されたらすぐに電源をオフにするかの選択をパソコンから設定することができ、必要に応じた電源のオフ制御を行なうことができる。

【００２８】（７）請求項７記載の発明は、電源オンの時、前記外部スイッチが押された時に前記第２のインタフェースから前記外部記憶ユニットに対するコマンドが無いのを一定時間確認し、一定時間無い時には前記第１のインタフェースにあるコマンドを発行し、特定のレスポンスが外部記憶ユニットから返ってきたら電源をオフにするか、外部スイッチが押されたらすぐに電源をオフにするかの選択を第２のインタフェースを介して指示できることを特徴とする。

【００２９】このように構成すれば、外部記憶ユニットに一定時間コマンドが無い場合に、外部記憶ユニットから特定のレスポンスが返ってきてから電源をオフにするか、或いは外部スイッチが押されたらすぐに電源をオフにするかの選択や時間設定をパソコンからすることができ、必要に応じた電源のオフ制御を行なうことができる。

【００３０】（８）請求項８記載の発明は、前記第２のインタフェースから前記外部記憶ユニットに対する要求が一定時間無い時には、電源をオフにするかどうかの選択を第２のインタフェースを介して指示できることを特徴とする。

【００３１】このように構成すれば、外部記憶ユニットに対する要求が一定時間無い時に、電源をオフにするかどうかの選択や時間設定をパソコンからできるので、必要に応じた電源のオフ制御を行なうことができる。

【００３２】（９）請求項９記載の発明は、前記外部記憶ユニットはリムーバブルメディア・ドライブユニットであり、該メディアが外部記憶ユニットに入っていない状態が一定時間経過した時は、電源をオフにするかどうかの選択を前記第２のインタフェースを介して指示できることを特徴とする。

【００３３】このように構成すれば、リムーバブルメディアが外部記憶ユニットに入っていない状態が一定時間経過した時に、電源をオフにするかどうかの選択や時間設定をパソコンからできるので、必要に応じた電源のオフ制御を行なうことができる。

【００３４】（１０）請求項１０記載の発明は、決まった時間の設定を前記第２のインタフェースを介して指示できることを特徴とする。このように構成すれば、決まった時間の設定をパソコンから指示でき、必要に応じた電源のオンオフ制御を行なうことができる。

【００３５】（１１）請求項１１記載の発明は、電源オンの時、前記外部スイッチが押された時に、前記制御装

置は、第2のインタフェースを通じて外部装置に通知し、該外部装置の指示で電源をオフにすることを特徴とする。

【００３６】このように構成すれば、外部装置から電源のオフ制御を行なうことができる。

【００３７】

【発明の実施の形態例】以下、図面を参照して本発明の実施の形態例を詳細に説明する。図１は本発明の一実施の形態例を示すブロック図である。図１２と同一のものは、同一の符号を付して示す。図に示す実施の形態例は、図１２の構成図に、内部スイッチ３５が加わった点と外部スイッチ２２が電流をオンオフするものから第４図に示すものに変わった点が異なり、その他の構成要素は図１１と同じである。外部記憶ユニット（例えばMOドライブ）１０とブリッジシステム２０とはＳＣＳＩケーブル２５と電源供給ライン３６とで接続されている。

【００３８】電源４からの電源は電源ジャック２１を介してブリッジシステム２０に入っている。ブリッジシステム２０に入った電源は、ブリッジ用電源２９によりブリッジシステム２０の動作用の電源が作成される。一方、電源ジャック２１から入った電源は、内部スイッチ３５を介して電源供給ライン３６を介して外部記憶ユニット１０に入っている。

【００３９】パソコン１はコネクタ２３を介してＵＳＢコントローラ２７と接続されている。該ＵＳＢコントローラ２７は、データバス３０を介してＳＣＳＩコントローラ２６と接続されている。制御装置２８は、データバス３０を介してＳＣＳＩコントローラ２６及びＵＳＢコントローラ２７と接続されている。また、制御装置２８からは、内部スイッチ３５にオンオフ制御信号２ｇが出力される。

【００４０】電源スイッチ（外部スイッチ）２２は、図４に示すように、制御装置２８へローアクチブの信号を与える。即ち、外部スイッチ２２が押された時に、“Ｌ”レベルの信号が制御装置２８に与えられる。５は、制御装置（以下ＣＰＵという）２８から制御されるＬＥＤである。該ＬＥＤ５は、電源オンオフを表示するものである。

【００４１】パソコン１からＵＳＢケーブルを通じて送られるコマンドやデータ等は、ＵＳＢコントローラ２７でＵＳＢプロトコルからＣＰＵ２８で処理できる形に変換される。これをＣＰＵ２８がＳＣＳＩコントローラ２６が扱える形式に変換して送る。ＳＣＳＩコントローラ２６はＳＣＳＩプロトコルに変換し、外部記憶ユニット１０に送る。外部記憶ユニット１０からのパソコン１へのコマンドやデータの転送はその逆をたどる。このように、請求項１で述べられた変換装置とは、ここでは、ＵＳＢコントローラ２７、ＳＣＳＩコントローラ２６及びＣＰＵ２８を示す。このように構成された装置の動作を図２のフローチャートを参照しつつ説明すれば、以下の通りである。

【００４２】図２は本発明の第１の動作例を示すフローチャートである。ブリッジシステム２０に電源４が接続されると（Ｓ１１）、ブリッジ用電源２９から電源が供給されＣＰＵ２８が動作を開始する。ＣＰＵ２８はブリッジシステム２０を初期化する（Ｓ１２）。その後、ＣＰＵ２８は外部スイッチ２２が押されるのを待つ（Ｓ１３）。

【００４３】外部スイッチ２２が押されると、ＣＰＵ２８は内部スイッチ３５をオンにして外部記憶ユニット１０に電源を供給し（Ｓ１４）、ＬＥＤ５を点灯する（Ｓ１５）。このＬＥＤ５が点灯することで、電源が入ったことを認識することができる。

【００４４】その後、ＣＰＵ２８は、ＵＳＢコントローラ２７とＳＣＳＩコントローラ２６を使用してブリッジ動作を行ない、パソコン１と外部記憶ユニット１０とをうまく通信させる（Ｓ１６）。内部スイッチ３５がオンの時、外部スイッチ２２が押されると（Ｓ１７）、ＣＰＵ２８は電源オフのための後処理に入る（Ｓ１８）。

【００４５】後処理では、ＣＰＵ２８はＬＥＤ５を点滅させて後処理に入ったことをオペレータに知らせる（Ｓ２１）。その後、パソコン１からデータコピー依頼があるかどうか一定時間チェックする（Ｓ２２）。パソコン１から送られるデータは、小さなブロックに分割されて送られる。従って、ステップＳ２２でパソコン１の全てのデータの送出が終わったかどうかをチェックする必要がある。

【００４６】パソコン１から再度データ転送依頼があった場合には、ステップＳ１６に戻り、ブリッジ動作を行なう。データ転送依頼がない場合には、ＣＰＵ２８はソフトタイマを用いて例えば１秒たったかどうかチェックする（Ｓ２３）。データ転送依頼が１秒以上ない場合には、ＣＰＵ２８は次に特定のコマンドコマンド）をＳＣＳＩコントローラ２６を介して外部記憶ユニット１０に発行する（Ｓ２４）。

【００４７】その理由としては、外部記憶ユニット１０にキャッシュがある場合、不揮発性メモリ（実際のＨＤ、ＭＯ、ＣＤそのもの）に書き込み処理が終了していなくても外部記憶ユニット１０は、ブリッジシステム２０に対してＳＣＳＩコントローラ２６を介して処理が終了したことを告げるからである。

【００４８】この処理終了通知を受けたＣＰＵ２８は、外部記憶ユニット１０内のキャッシュ（図示せず）に書き込むべきデータが全て揃ったことを認識し、次に確実に記憶媒体への書き込みが終了したことを検知する必要がある。そのため、例えば、ＣＰＵ２８は、第１インタフェースがＳＣＳＩの時は、スピンダウン（Ｓｐｉｎｄｏｗｎ）コマンドを発行する（Ｓ２４）。ここで、スピンダウンコマンドとは、例えばＭＯの回転を止めるための信号である。外部記憶ユニット１０内のＣＰＵ（図示

せず）はスピンダウンコマンドを受けて記憶媒体へのデータ書き込みが終了すると、ブリッジシステム２０に対してＧＯＯＤコンデションを返す。ここで、コマンドはスピンダウンだけに限定されない。リムーバブルメディア・ドライブユニットならば、イジェクトでもよい。但し、最後にメディアが排出される。

【００４９】ＣＰＵ２８は、外部記憶ユニット１０からＧＯＯＤコンデションが返ってきたら（Ｓ２５）、ＬＥＤ５をオフにし（Ｓ２６）、内部スイッチ３５をオフにする（Ｓ２７）。この状態で、外部記憶ユニット１０への電源供給は絶たれる。次に、ステップＳ１３に戻り、外部スイッチ２２が押されるのを待つ。

【００５０】この実施の形態例によれば、外部記憶ユニット１０に全てのデータが書き込まれた時に、外部記憶ユニット１０から返ってくる特定のレスポンス（ここではＧＯＯＤコンデション）を受けると、電源をオフにするので、外部記憶ユニット１０にパソコン１が送る全てのデータを確実に書き込んでから電源をオフにすることができる。

【００５１】図３は本発明の第２の実施の形態例を示すブロック図である。図１と同一のものは、同一の符号を付して示す。この実施の形態例は、外部記憶ユニット１０としてＡＴＡＰＩインタフェースを用いた場合の回路を示す。この場合、図１に示すような第１インタフェースコントローラは不要となる。インタフェースコントローラ２７は、インタフェース部３３を介してコネクタ２３と接続され、パソコン１と接続されている。

【００５２】ここでは、インタフェースコントローラ２７として、ＩＥＥＥ１３９４用のものを用いている。ＩＥＥＥ１３９４用通信線は、内部に電源用線を含むので、若し、パソコン１から電源を供給できる場合、その電源線もコネクタ２３と接続される。この場合、電源は逆流防止用のダイオードＤ２を介して電源ラインに接続される。一方、電源４からの電源も電源ジャック２１を介して逆流防止用ダイオードＤ１を介して電源ラインに接続されている。この結果、ブリッジシステム２０を動作させるための電源をパソコン１側と電源４側から供給することができ、逆流防止用ダイオードＤ１、Ｄ２を介して電源の並列運転が可能となる。

【００５３】制御装置（ＣＰＵ）２８は、データバス３０を介してインタフェースコントローラ２７及びＡＴＡＰＩインタフェース２４と接続されている。このように構成されたシステムにおいて、外部スイッチ２２からのオン信号により、ブリッジ用電源２９が供給されている場合について考える。パソコン１から外部記憶ユニット１０へのデータ書き込み要求が発生した場合、パソコン１からのＩＥＥＥ１３９４に準拠したデータは、インタフェース部３３を介してインタフェースコントローラ２７に入り、ＣＰＵ２８との間でインタフェース用制御信号のやりとりを行ない、ＩＥＥＥ１３９４準拠のデータをＡＴＡＰＩのデータに変換することができる。ＡＴＡＰＩ形式に変換されたデータは、一旦外部記憶ユニット１０のキャッシュに格納され、その後記憶媒体に書き込まれる。

【００５４】ここで、キャッシュに全データが記憶されると、外部記憶ユニット１０からブリッジシステム２０に対して、処理終了信号が出力される。この処理終了信号を受けたＣＰＵ２８は、外部記憶ユニット１０に対して、特定のコマンド（例えばＳｐｉｎｄｏｗｎ）を発行する。このコマンドを受けた外部記憶ユニット１０では、記憶媒体へのデータ書き込みが完了した時、内部ＣＰＵからデータ書き込み完了（ＧＯＯＤコンデション）信号が出力される。ＣＰＵ２８は、このＧＯＯＤコンデション信号を受けると、内部スイッチ３５を制御し、接点を解放する。これにより、外部記憶ユニット１０に供給されていた電源は断になる。

【００５５】この実施の形態例の場合も、外部記憶ユニット１０に全てのデータが書き込まれた時に、外部記憶ユニット１０から返ってくる特定のレスポンス（ここではＧＯＯＤコンデション）を受けると、電源をオフにするので、外部記憶ユニット１０にパソコン１が送る全てのデータを確実に書き込んでから電源をオフにすることができる。

【００５６】上述した実施の形態例によれば、上記電源制御が既存の外部記憶ユニットやパソコンのソフトに変更を必要とせずに行なえるという効果がある。図５は本発明の第３の実施の形態例を示すブロック図である。図１と同一のものは、同一の符号を付して示す。図において、３７はブリッジシステム２０内に設けられたタイマであり、ＣＰＵ２８と接続されている。該タイマ３７は、時刻を計時し、バッテリーでバックアップされている。従って、回路の電源が断になっても、タイマ３７は時刻を刻み続ける。その他の構成は、図１の構成と全く同一である。このように構成されたシステムを用いて本発明の動作を説明する。

【００５７】図６は本発明の第２の動作例を示すフローチャートである。ブリッジシステム２０に電源４がつながれると（Ｓ１１）、ブリッジ用電源２９から電源が供給され、ＣＰＵ２８が動作を開始する。ＣＰＵ２８は、ブリッジシステム２０を初期化する（Ｓ１２）。その後、ＣＰＵ２８は、外部スイッチ２２が押されるのを待つ（Ｓ１３）。

【００５８】外部スイッチ２２が押されると、ＣＰＵ２８は内部スイッチ３５をオンして外部記憶ユニット１０に電源を供給し（Ｓ１４）、ＬＥＤ５を点灯する（Ｓ１５）。その後、ＣＰＵ２８はＳＣＳＩコントローラ２６とＵＳＢコントローラ２７を使用してブリッジ動作を行ない、パソコン１と外部記憶ユニット１０とをうまく通信させる（Ｓ１６）。

【００５９】次に、ブリッジ動作が終了すると、ＣＰＵ

２８はタイマ３７の時刻を読みに行く。一方、ＣＰＵ２８は外部スイッチ２２が押されたかどうかをチェックする（Ｓ１７ａ）。外部スイッチ２２が押された場合には後処理に入る（Ｓ１８）。外部スイッチ２２が押されない場合、ＣＰＵ２８はタイマ３７を用いてパソコン１からのアクセス無しの時間をカウントする（Ｓ１７ｂ）。つまり、最後にアクセスがあった時の時刻を読み込んでおき、その後の経過時間をカウントすることになる。若し、パソコン１からのアクセスがあった場合には、ＣＰＵ２８は読み込んだ時刻情報を無視する。

【００６０】パソコン１からのアクセスがあった場合には、ステップ１６に戻りブリッジ動作を行なう。パソコン１からのアクセスがない状態が１５分経過した場合、ＣＰＵ２８は後処理に入る（Ｓ１８）。後処理は、図２に示した後処理と全く同じ処理である。図の①、②からの接続も、図２の後処理のシーケンスと対応している。

【００６１】この実施の形態例によれば、第２のインタフェースから外部記憶ユニットに対する要求が一定時間無い場合には、電源をオフにして外部記憶ユニットの無駄な電力消費を抑えることができる。

【００６２】図７は本発明の第３の動作例を示すフローチャートである。システム構成としては、図５を用いる。ブリッジシステム２０に電源４がつながれると（Ｓ１１）、ブリッジ用電源２９から電源が供給され、ＣＰＵ２８が動作を開始する。ＣＰＵ２８は、ブリッジシステム２０を初期化する（Ｓ１２）。その後、ＣＰＵ２８は、外部スイッチ２２が押されるのを待つ（Ｓ１３）。

【００６３】外部スイッチ２２が押されると、ＣＰＵ２８は内部スイッチ３５をオンして外部記憶ユニット１０に電源を供給し（Ｓ１４）、ＬＥＤ５を点灯する（Ｓ１５）。その後、ＣＰＵ２８はＳＣＳＩコントローラ２６とＵＳＢコントローラ２７を使用してブリッジ動作を行ない、パソコン１と外部記憶ユニット１０とをうまく通信させる（Ｓ１６）。

【００６４】次に、ブリッジ動作が終了すると、ＣＰＵ２８は外部スイッチ２２が押されたかどうかをチェックする（Ｓ１７ａ）。この場合において、ＣＰＵ２８はパソコン１から最後のアクセスがあった時刻を記憶しておく。外部スイッチ２２が押された場合には、後処理に入る（Ｓ１８）。外部スイッチ２２が押されない場合には、パソコン１からのアクセス無しが１５分経ったかどうかチェックする（Ｓ１７ｂ）。この１５分の時間の経過は、ＣＰＵ２８がタイマ３７の時刻情報を読みに行き、前記パソコン１から最後のアクセスがあった時刻を差し引くことによりカウントされる。

【００６５】パソコン１からのアクセス無しが１５分経った場合には、後処理に入る（Ｓ１８）。パソコン１からのアクセス無しが１５分経たない場合には、ＣＰＵ２８はリムーバブルメディア（以下メディアと略す）無しが５分経ったかどうかチェックする（Ｓ１７ｃ）。この場合において、ＣＰＵ２８はメディアが挿入されていたらタイマ３７を読みに行かない。そして、メディアが引き抜かれたらＣＰＵ２８はタイマ３７を読みに行き、その時の時刻を記憶しておく。そして、メディア無しが５分経過したら、後処理に入る（Ｓ１８）。後処理のシーケンスは、図２に示したものと全く同一である。図の①、②からの接続も、図２の後処理のシーケンスと対応している。

【００６６】この実施の形態例によれば、リムーバブルメディアが外部記憶ユニット１０に入っていない状態が一定時間以上続く時には電源をオフにすることにより、外部記憶ユニット１０の無駄な電力消費を抑えることができる。

【００６７】図８は本発明の第４の動作例を示すフローチャートである。システム構成としては、図５を用いる。ブリッジシステム２０に電源４がつながれると（Ｓ１１）、ブリッジ用電源２９から電源が供給され、ＣＰＵ２８が動作を開始する。この場合において、ＣＰＵ２８には予約時間が予め記憶されているものとする。ＣＰＵ２８は、ブリッジシステム２０を初期化する（Ｓ１２）。その後、ＣＰＵ２８は、外部スイッチ２２が押されるのを待つ（Ｓ１３ａ）。外部スイッチ２２が押された場合には、ステップＳ１４以降の処理に進む。

【００６８】外部スイッチ２２が押されない場合には、外部スイッチ２２が押されるのを待つ。この間に、タイマ３７を読みに行き、タイマ３７の時刻が予約時間になったら、ＣＰＵ２８はそのことを検出して内部スイッチ３５をオンにする（Ｓ１３）。この結果、外部記憶ユニット１０に電源が供給されるようになる。同時に、ＬＥＤ５を点灯する（Ｓ１５）。その後、ＣＰＵ２８はＳＣＳＩコントローラ２６とＵＳＢコントローラ２７を使用してブリッジ動作を行ない、パソコン１と外部記憶ユニット１０とをうまく通信させる（Ｓ１６）。

【００６９】次に、ブリッジ動作が終了すると、ＣＰＵ２８は外部スイッチ２２が押されたかどうかをチェックする（Ｓ１７ａ）。この場合において、ＣＰＵ２８はパソコン１から最後のアクセスがあった時刻を記憶しておく。外部スイッチ２２が押された場合には、後処理に入る（Ｓ１８）。外部スイッチ２２が押されない場合には、パソコン１からのアクセス無しが１５分経ったかどうかチェックする（Ｓ１７ｂ）。この１５分の時間の経過は、ＣＰＵ２８がタイマ３７の時刻情報を読みに行き、前記パソコン１から最後のアクセスがあった時刻を差し引くことによりカウントされる。

【００７０】パソコン１からのアクセス無しが１５分経った場合には、後処理に入る（Ｓ１８）。パソコン１からのアクセス無しが１５分経たない場合には、ＣＰＵ２８はリムーバブルメディア（以下メディアと略す）無しが５分経ったかどうかチェックする（Ｓ１７ｃ）。この場合において、ＣＰＵ２８はメディアが挿入されていた

らタイマ３７を読みに行かない。そして、メディアが引き抜かれたらＣＰＵ２８はタイマ３７を読みに行き、その時の時刻を記憶しておく。そして、メディア無しが５分経過したら、後処理に入る（Ｓ１８）。後処理のシーケンスは、図２に示したものと全く同一である。図の①、②からの接続も、図２の後処理のシーケンスと対応している。

【００７１】この実施の形態例によれば、パソコン１のバックアッププログラムと連携し、自動バックアップを行なうことができる。図９は本発明の第５の動作例を示すフローチャートである。この実施の形態例では、外部記憶装置の電源のオフ制御を外部装置（例えばパソコン）から行なうことができるようにしたものである。図は、後処理を示しており、後処理までは既述したものと同様である。今までの発明では、制御装置（ＣＰＵ）２８がスピンダウンのコマンドを発行していたが、この発明ではスピンダウンのコマンドを外部装置（例えばパソコン）側から発行するようにしたものである。また、電源オフの許可もパソコン側が指示する。システム構成としては、図１を用いる。

【００７２】後処理に入ると（Ｓ２０）、ＬＥＤ５を点滅させて後処理に入ったことを知らせる（Ｓ２１）。外部スイッチ２２が押されると、ＣＰＵ２８は第２のインタフェース（ＵＳＢインタフェース）を通してパソコン１にスイッチが押されたことを通知する（Ｓ２３）。

【００７３】ＣＰＵ２８は、パソコン１から電源オフの指示があるまでブリッジ動作を続ける（Ｓ２４、Ｓ２５）。パソコン１は、全てのデータを排出し終わったら、スピンダウンコマンドを外部記憶装置に発行する。外部記憶装置からＧＯＯＤコンデションが返ってくれば、全てのデータが不揮発メモリに書き込まれたことを認識でき、外部記憶装置のＣＰＵ２８に対して電源オフの指示を行なう（Ｓ２４、Ｓ２５）。ＣＰＵ２８は、パソコン１からの指示を受けてＬＥＤ５をオフにし（Ｓ２６）、内部スイッチ３５を解放して電源をオフにする（Ｓ２７）。

【００７４】この実施の形態例によれば、外部装置（例えばパソコン）から電源のオフ制御を行なうことができる。本発明では、パソコンからユーティリティソフト等を動作させて、前述した発明の機能を使用するかしないかユーザが選択したり、待ち時間の設定の指示ができる。

【００７５】例えば、電源オンの時、外部スイッチ２２が押された時に前記第１のインタフェース（ＳＣＳＩインタフェース）にあるコマンドを発行し、特定のレスポンスが前記外部記憶ユニット１０から返ってきたら電源をオフにするか、外部スイッチ２２が押されたらすぐに電源をオフにするかの選択を前記第２のインタフェースを介してユーザが指示できることようにすることができる。

【００７６】このように構成すれば、外部記憶ユニット１０から特定のレスポンスが返ってきてから電源をオフにするか、或いは外部スイッチ２２が押されたらすぐに電源をオフにするかの選択をパソコン１から設定することができ、必要に応じた電源のオフ制御を行なうことができる。

【００７７】また、電源オンの時、外部スイッチ２２が押された時に前記第２のインタフェース（ＵＳＢインタフェース）から前記外部記憶ユニット１０に対するコマンドが無いのを一定時間確認し、一定時間無い時には前記第１のインタフェースにあるコマンドを発行し、特定のレスポンスが外部記憶ユニット１０から返ってきたら電源をオフにするか、外部スイッチ２２が押されたらすぐに電源をオフにするかの選択を第２のインタフェースを介して指示できるようにすることができる。

【００７８】このように構成すれば、外部記憶ユニット１０に一定時間コマンドが無い場合に、外部記憶ユニット１０から特定のレスポンスが返ってきてから電源をオフにするか、或いは外部スイッチ２２が押されたらすぐに電源をオフにするかの選択や時間設定をパソコン１からすることができ、必要に応じた電源のオフ制御を行なうことができる。

【００７９】また、第２のインタフェース（ＵＳＢインタフェース）から前記外部記憶ユニット１０に対する要求が一定時間無い時には、電源をオフにするかどうかの選択や一定時間の設定を第２のインタフェースを介して指示できるようにすることができる。

【００８０】このように構成すれば、外部記憶ユニット１０に対する要求が一定時間無い時に、電源をオフにするかどうかの選択や時間設定をパソコンからできるので、必要に応じた電源のオフ制御を行なうことができる。

【００８１】また、外部記憶ユニット１０はリムーバブルメディアであり、該メディアが外部記憶ユニット１０に入っていない状態が一定時間経過した時は、電源をオフにするかどうかの選択を前記第２のインタフェースを介して指示できるようにすることができる。

【００８２】このように構成すれば、リムーバブルメディアが外部記憶ユニットに入っていない状態が一定時間経過した時に、電源をオフにするかどうかの選択や時間設定をパソコンからできるので、必要に応じた電源のオフ制御を行なうことができる。

【００８３】また、決まった時間の設定を前記第２のインタフェースを介して指示できるようにすることができる。このように構成すれば、決まった時間の設定をパソコンから指示でき、必要に応じた電源のオンオフ制御を行なうことができる。

【００８４】

【発明の効果】以上、詳細に説明したように、本発明によれば、以下の効果が得られる。

（１）請求項１記載の発明によれば、外部記憶ユニットに全てのデータが書き込まれた時に、外部記憶ユニットから返ってくる特定のレスポンスを受けると、電源をオフにするので、外部記憶ユニットに確実にデータを書き込んでから電源をオフにすることができる。

【００８５】（２）請求項２記載の発明によれば、第２のインタフェースから前記外部記憶ユニットに対するコマンドが一定時間無い場合に、外部記憶ユニットに全てのデータが書き込まれた時に、外部ユニットから返ってくる特定のレスポンスを受けると、電源をオフにするので、外部記憶ユニットにパソコンが送る全てのデータを確実に書き込んでから電源をオフにすることができる。

【００８６】（３）請求項３記載の発明によれば、第２のインタフェースから外部記憶ユニットに対する要求が一定時間無い場合には、電源をオフにして、外部記憶ユニットの無駄な電力消費を抑えることができる。

【００８７】（４）請求項４記載の発明によれば、リムーバブルメディアが外部記憶ユニットに入っていない状態が一定時間続く時には電源をオフにすることにより、外部記憶ユニットの無駄な電力消費を抑えることができる。

【００８８】（５）請求項５記載の発明によれば、パソコンのバックアッププログラムと連携し、自動バックアップを行なうことができる。

（６）請求項６記載の発明によれば、外部記憶ユニットから特定のレスポンスが返ってきてから電源をオフにするか、或いは外部スイッチが押されたらすぐに電源をオフにするかの選択をパソコンから設定することができ、必要に応じた電源のオフ制御を行なうことができる。

【００８９】（７）請求項７記載の発明によれば、外部記憶ユニットに一定時間コマンドが無い場合に、外部記憶ユニットから特定のレスポンスが返ってきてから電源をオフにするか、或いは外部スイッチが押されたらすぐに電源をオフにするかの選択や時間設定をパソコンからすることができ、必要に応じた電源のオフ制御を行なうことができる。

【００９０】（８）請求項８記載の発明によれば、外部記憶ユニットに対する要求が一定時間無い時に、電源をオフにするかどうかの選択や時間設定をパソコンからできるので、必要に応じた電源のオフ制御を行なうことができる。

【００９１】（９）請求項９記載の発明によれば、リムーバブルメディアが外部記憶ユニットに入っていない状態が一定時間経過した時に、電源をオフにするかどうかの選択や時間設定をパソコンからできるので、必要に応じた電源のオフ制御を行なうことができる。

【００９２】（１０）請求項１０記載の発明によれば、決まった時間の設定をパソコンから指示でき、必要に応じた電源のオンオフ制御を行なうことができる。

（１１）請求項１１記載の発明によれば、外部装置から電源のオフ制御を行なうことができる。

【００９３】このように、本発明によれば、外部記憶ユニットに確実にデータを書き込んでから電源をオフにすることができる外部記憶装置の電源制御回路を提供することができる。また、上記の電源制御が既存の外部記憶ユニットのソフトに変更を必要とせずに行なえる。

【図面の簡単な説明】

【図１】本発明の第１の実施の形態例を示すブロック図である。

【図２】本発明の第１の動作例を示すフローチャートである。

【図３】本発明の第２の実施の形態例を示すブロック図である。

【図４】外部スイッチの構成例を示す図である。

【図５】本発明の第３の実施の形態例を示すブロック図である。

【図６】本発明の第２の動作例を示すフローチャートである。

【図７】本発明の第３の動作例を示すフローチャートである。

【図８】本発明の第４の動作例を示すフローチャートである。

【図９】本発明の第５の動作例を示すフローチャートである。

【図１０】パソコンと外部記憶装置を示す図である。

【図１１】ＵＳＢ又はＩＥＥＥ１３９４インタフェース付外部記憶装置の外観構成例を示す図である。

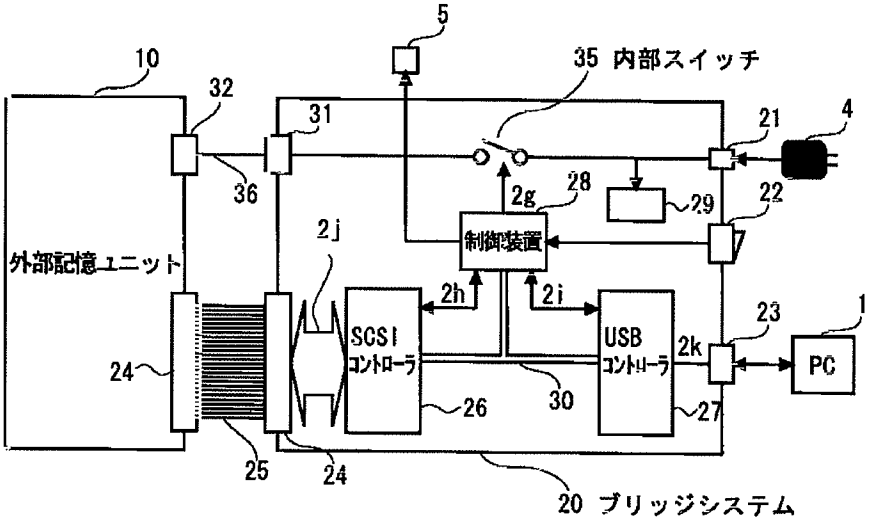
【図１２】ＵＳＢ又はＩＥＥＥ１３９４インタフェース付外部記憶装置の従来構成例を示すブロック図である。

【符号の説明】

１　パソコン
４　電源
５　ＬＥＤ
１０　外部記憶ユニット
２０　ブリッジシステム
２１　電源ジャック
２２　外部スイッチ
２３　コネクタ
２４　ＳＣＳＩインタフェース
２５　ケーブル
２６　ＳＣＳＩコントローラ
２７　ＵＳＢコントローラ
２８　制御装置（ＣＰＵ）
２９　ブリッジ用電源
３０　データバス
３１、３２　コネクタ
３５　内部スイッチ
３６　電源供給ライン

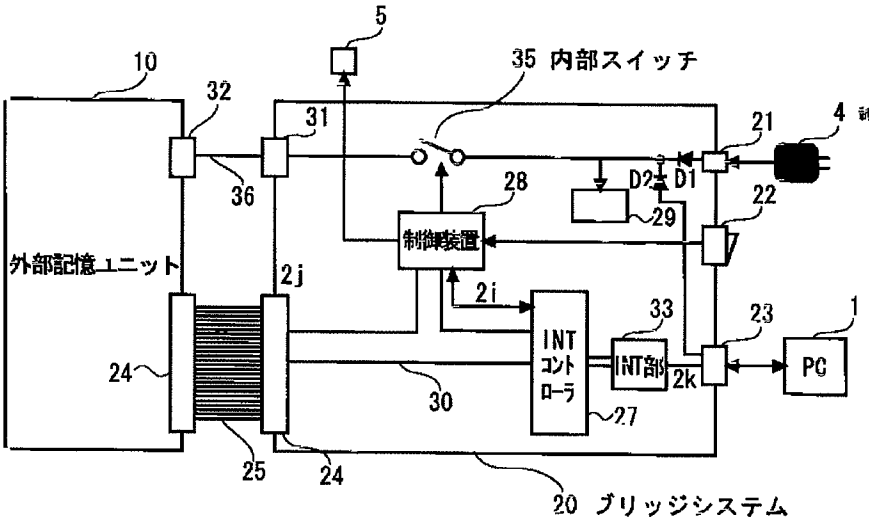
【図1】

本発明の第１の実施の形態例を示すブロック図



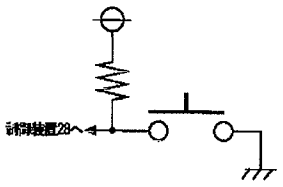
【図3】

本発明の第２の実施の形態例を示すブロック図



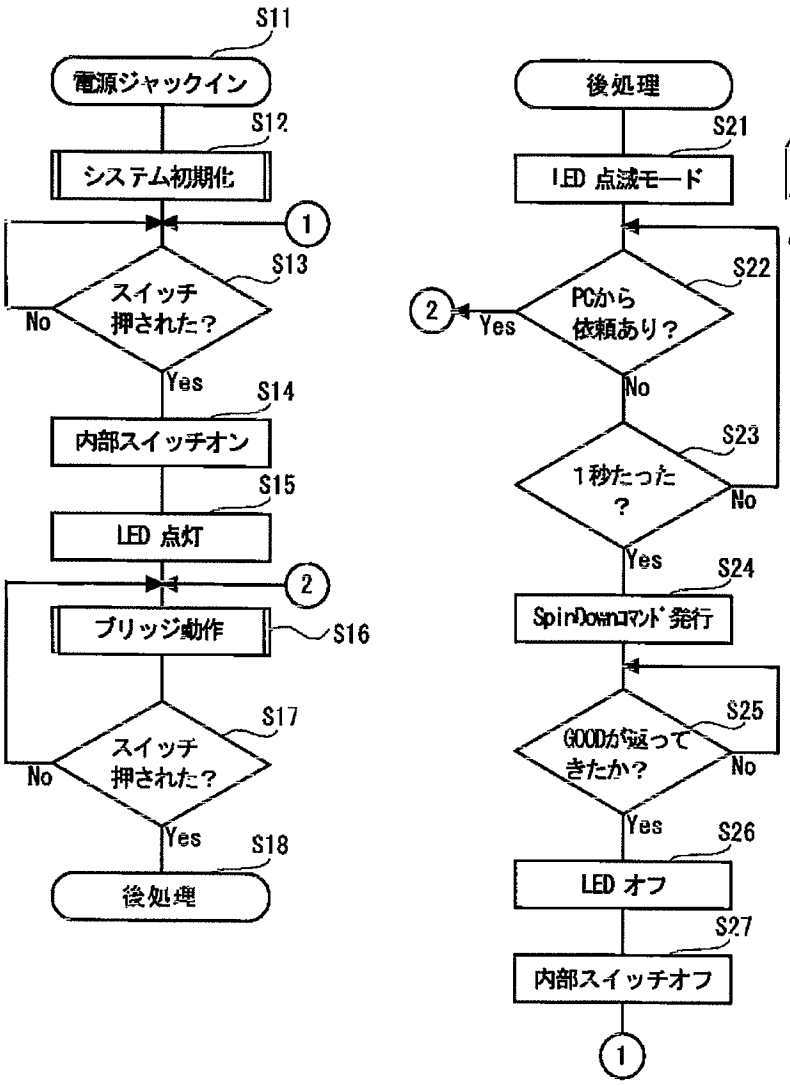
【図4】

外部スイッチの構成例を示す図



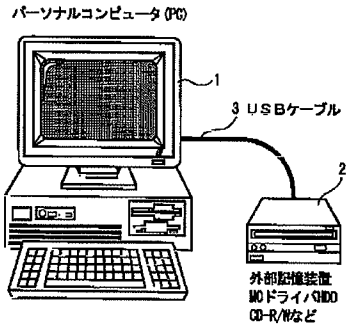
【図2】

本発明の第１の動作例を示すフローチャート



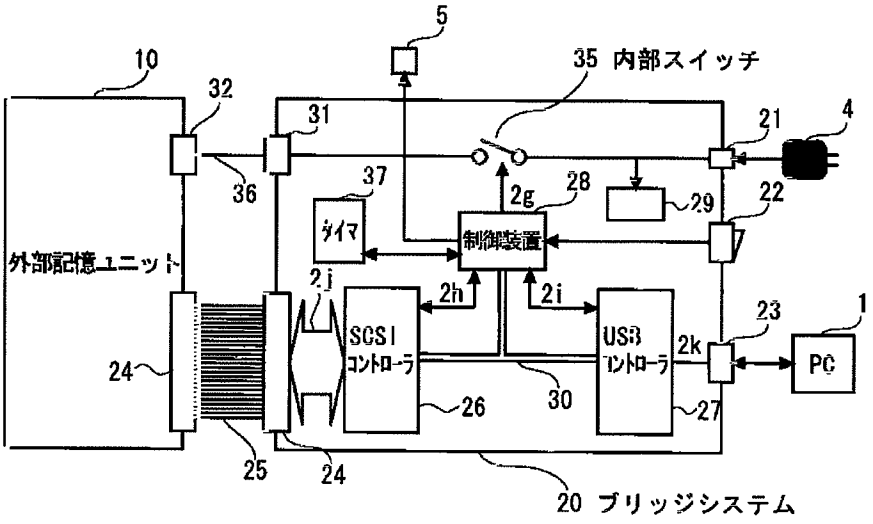
【図１０】

パソコンと外部記憶装置を示す図



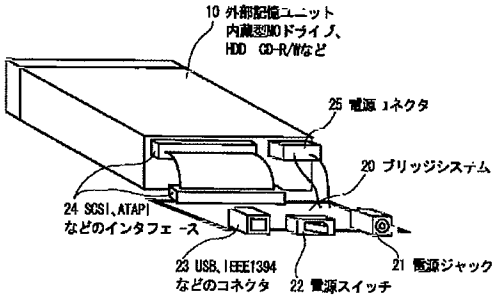
【図5】

本発明の第３の実施の形態例を示すブロック図



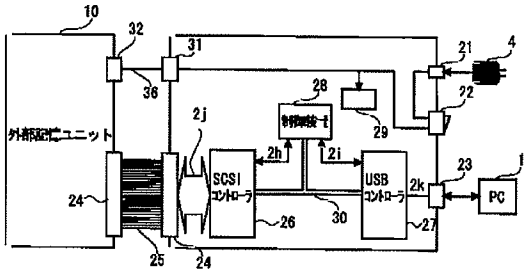
【図11】

USB又はＩＥＥＥ１３９４インタフェース付外部記憶装置の外観構成例を示す図



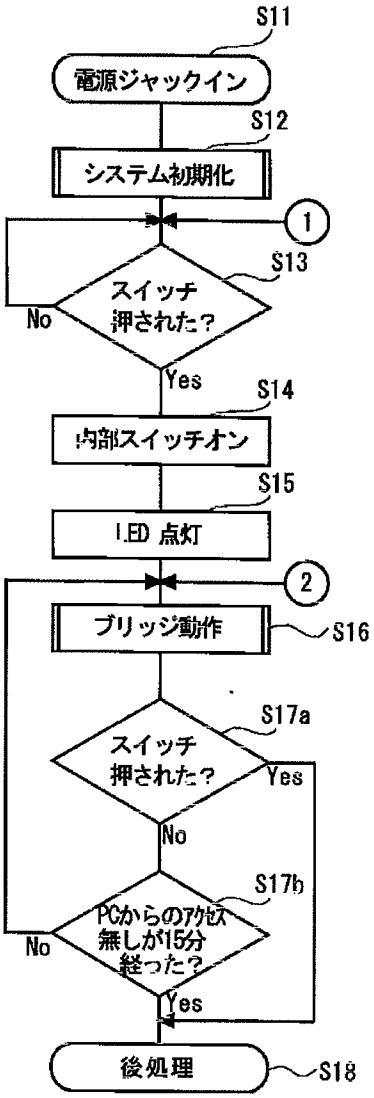
【図12】

USB又はＩＥＥＥ１３９４インタフェース付外部記憶装置の従来構成例を示すブロック図



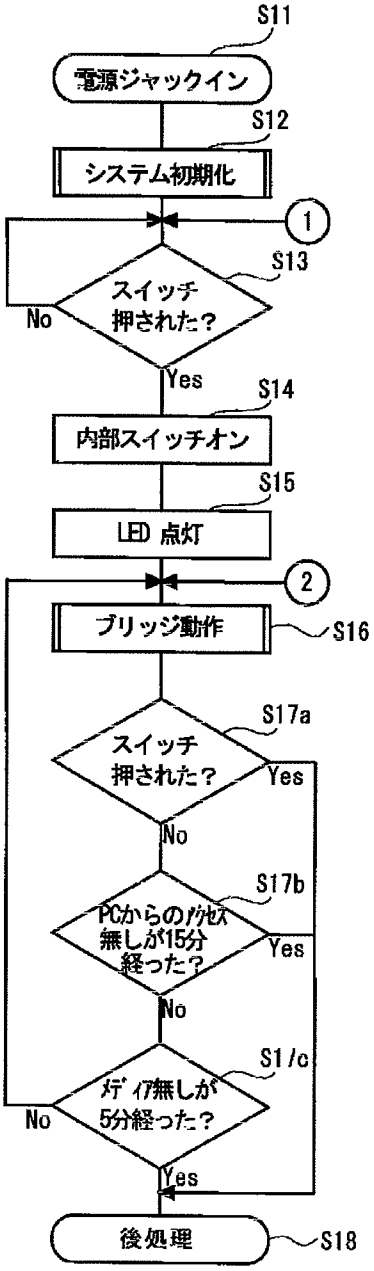
【図6】

本発明の第２の動作例を示すフローチャート



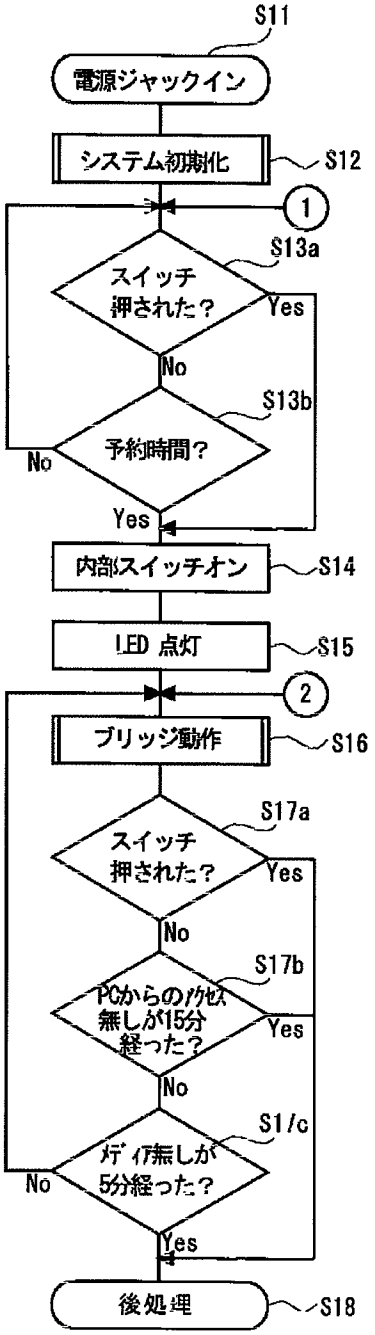
【図7】

本発明の第３の動作例を示すフローチャート



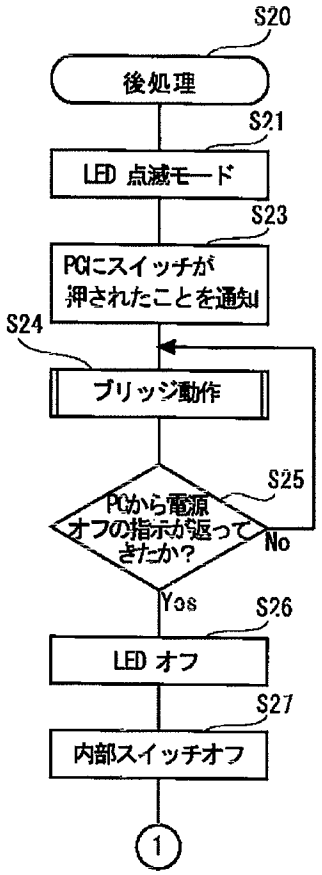
【図8】

本発明の第３の動作例を示すフローチャート



【図9】

本発明の第５の動作例を示すフローチャート



フロントページの続き

(51)Int.Cl.[7]	識別記号	ＦＩ		(参考)
		Ｇ０６Ｆ 1/00	３３４Ｆ	
			３３４Ｇ	

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]Have the following, and if it detects that said Out switch was pushed at the time of a power turn, said control device, A control circuit of an external storage releasing said internal switch and turning OFF a power supply if a command in the 1st interface is published and a specific response returns from an enternal memory unit.
An enternal memory unit which memorizes data.
The 1st interface connected with this enternal memory unit.
The 2nd interface for connecting with an external instrument.
A device which changes a data format of this 1st interface and the 2nd interface, a control device which controls the whole operation, an internal switch for supplying a power supply to said enternal memory unit, and an Out switch which gives an on-off signal of a power supply.

[Claim 2]If it detects that said Out switch was pushed at the time of a power turn, said control device, The fixed time check of the thing without a command or data to said said enternal memory unit from the 2nd interface is carried out, A control circuit of the external storage according to claim 1 releasing said internal switch and turning OFF a power supply if a command in said 1st interface is published and a specific response returns from an enternal memory unit when there is no fixed time.
[Claim 3]A control circuit of the external storage according to any one of claims 1 to 2 releasing said internal switch from said 2nd interface when there is no command over said enternal memory unit in fixed time, and turning OFF a power supply.
[Claim 4]When the state where said enternal memory unit is a removable media drive unit, and these media are not contained in an enternal memory unit carries out fixed time lapse, A control circuit of the external storage according to any one of claims 1 to 3 releasing said internal switch and turning OFF a power supply.
[Claim 5]a time check which times time — a control circuit of the external storage according to any one of claims 1 to 4 making a power supply one or turning it OFF if a means is provided and it becomes at regular time.
[Claim 6]A command which is in said 1st interface at the time of a power turn when said Out switch is pushed is published, A control circuit of the external storage according to claim 1 being able to direct selection of whether a power supply will be turned OFF if a specific response returns from said enternal memory unit, or to turn OFF a power supply immediately after an Out switch is pushed via said 2nd interface.
[Claim 7]At the time of a power turn, when said Out switch is pushed, the fixed time check of the thing without a command over said enternal memory unit is carried out from said 2nd interface, A command which is in said 1st interface when there is no fixed time is published, A control circuit of the external storage according to claim 2 being able to direct selection of whether a power supply will be turned OFF if a specific response returns from an enternal memory unit, or to turn OFF a power supply immediately after an Out switch is pushed via the 2nd interface.
[Claim 8]A control circuit of the external storage according to claim 3 being able to direct

selection of whether to turn OFF a power supply via the 2nd interface from said 2nd interface when there is no demand to said enternal memory unit in fixed time.
[Claim 9]When the state where said enternal memory unit is a removable media drive unit, and these media are not contained in an enternal memory unit carries out fixed time lapse, A control circuit of the external storage according to claim 4 being able to direct selection of whether to turn OFF a power supply via said 2nd interface.
[Claim 10]A control circuit of the external storage according to claim 5 being able to direct setting out of regular time via said 2nd interface.
[Claim 11]A control circuit of the external storage according to claim 1 when said Out switch is pushed at the time of a power turn, wherein it notifies said control device to an external device through the 2nd interface and it turns OFF a power supply with directions of this external device.

[Translation done.]

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the control circuit of external memory storage, such as a personal computer (it abbreviates to a personal computer or PC below), in more detail about the control circuit of an external storage.
[0002]
[Description of the Prior Art]The external storage of the personal computer MO (optical-magnetic disc equipment), HDD (hard disk unit), and CD-R/W with modern interfaces, such as USB and IEEE1394, has appeared briskly. Drawing 10 is a figure showing a personal computer and an external storage. In the figure, 1 is a personal computer and is connected with the external storage 2 via USB cable 3.
[0003]Many of these external storages have many which have added the bridge system to the enternal memory unit (what is called a built-in MO drive, HDD, CD-R/W) with interfaces, such as the existing ATAPI and SCSI. The reason is as follows.
[0004]** Development of an enternal memory unit with a new interface and mass production take immense expense and period.
** At present, it cannot be decided which [of a new interface] becomes in use.
[0005]Since it is above, it is because a merit has many directions which develop or purchase the bridge system which changes ATAPI and SCSI into USB, IEEE1394, etc., and carry out external [of this].
[0006]Drawing 11 is a figure showing the example of appearance composition of USB or an external storage with an IEEE1394 interface. The conventional enternal memory unit 10 is made available by adding the bridge system 20 to the conventional enternal memory unit 10. The bridge system 20 is realized by attaching various kinds of necessary parts to a substrate. In the bridge system 20, a power supply jack and 22, an electric power switch and 23 are the interfaces of SCSI, ATAPI, etc., and 21 is connected with the bridge system 20 for connectors, such as USB and IEEE1394, and 24. Thus, the existing SCSI and the storage unit using an ATAPI interface can be used as USB and memory storage corresponding to IEEE1394 by forming a bridge system.
[0007]Improvement in the speed of an enternal memory unit is also desired with improvement in the speed of a personal computer, and improvement in the speed of an interface. Then, by collecting MO, HDD, and the data that stacks the high-speed semiconductor memory called the quick cash of access, and is transmitted from CD-R/W here temporarily, access as an external storage can be seemingly made quick, and a personal computer can be released early.
[0008]Drawing 12 is a block diagram showing the example of the conventional composition of USB or an external storage with an IEEE1394 interface. The same thing as drawing 10 attaches and shows the same numerals. The enternal memory unit 10 and the bridge system 20 are connected via the cable 25. 24 is a SCSI interface to which the cable 25 is connected.
[0009]In the bridge system 20, it is a USB controller (the 2nd interface controller) by which 26 is connected with a SCSI controller (the 1st interface controller), and 27 is connected with this SCSI controller 26. 28 is a control device which connects between SCSI controller 26 and USB

controller 27 via the data bus 30. As this control device 28, CPU is used, for example.
[0010]2j is the 1st interface signal that flows between SCSI controller 26 and SCSI interface 24. 1 is a personal computer and is connected with USB connector 23. 2k is the 2nd interface signal that flows between USB controller 27 and USB connector 23.
[0011]It is a power supply jack to which a power supply is connected to 4 and this power supply 4 is connected 21. The power supply inputted from this power supply jack 21 is supplied to the inside of a bridge system via the electric power switch 22. 29 is a power supply for bridges. The power for operating the bridge system 20 from this power supply 29 is supplied. A power supply is supplied also to the enternal memory unit 10 side via the connector 31, the connector 32, and the power supply line 36.
[0012]In the device constituted in this way, the control device 28 performs the interconversion between a USB interface and a SCSI interface via the control signal 2h for the 1st interface and the control signal 2i for the 2nd interface, and the data bus 30. Thereby, the data from the personal computer 1 goes into the bridge system 20 from USB controller 27, is changed into the data for SCSI interfaces, and is written in the enternal memory unit 10. That is, it becomes possible to write data to the enternal memory unit 10 using the conventional SCSI interface using a USB interface.
[0013]
[Problem(s) to be Solved by the Invention]USB and IEEE1394 have a hot plug function (function which can turn OFF a power supply when not using it), and when not using apparatus, they can cut a power supply at any time. However, the enternal memory unit with said cash will notify the completion of a copy to the personal computer 1, if all the file transfers are completed including the part collected on cash when a big file is copied from the personal computer 1.
[0014]It tells that the personal computer 1 carried out a display or non-display ** of the dialog etc. on the screen, and the copy ended it to the user. However, since write-in work is not actually completed only by being actually stocked by cash, if a power supply is turned OFF at this time, message data collected on cash will disappear.
[0015]In order to prevent such an accident, there is art given in JP,8-95715,A. However, in this invention, a busy announcement means is needed also for the enternal memory unit 10. Therefore, the problem of being inapplicable is among the enternal memory units which attached the bridge system to said existing enternal memory unit 10.
[0016]This invention is made in view of such a technical problem, and it aims at providing the control circuit of the external storage which can turn OFF a power supply after writing data in the existing enternal memory unit certainly.
[0017]
[Means for Solving the Problem](1) An enternal memory unit in which the invention according to claim 1 memorizes data, The 1st interface connected with this enternal memory unit, and the 2nd interface for connecting with an external instrument, A device which changes a data format of this 1st interface and the 2nd interface, A control device which controls the whole operation, and an internal switch for supplying a power supply to said enternal memory unit, Provide an Out switch which gives an on-off signal of a power supply, and if it detects that said Out switch was pushed at the time of a power turn, said control device, If a command in the 1st interface is published and a specific response returns from an enternal memory unit, said internal switch will be released and a power supply will be turned OFF.
[0018]Since a power supply will be turned OFF if are constituted in this way and a specific response to which it comes on the contrary will be received from an enternal memory unit when all the data is written in an enternal memory unit, a power supply can be turned OFF after writing data in an enternal memory unit certainly.
[0019](2) If it detects that said Out switch was pushed at the time of a power turn, the invention according to claim 2 said control device, The fixed time check of the thing without a command or data to said said enternal memory unit from the 2nd interface is carried out, If a command in said 1st interface is published and a specific response returns from an enternal memory unit when there is no fixed time, said internal switch will be released and a power supply will be turned OFF.

[0020]If constituted in this way, in fixed time, a command over said enternal memory unit from the 2nd interface when there is nothing, Since a power supply will be turned OFF if a specific response to which it comes on the contrary is received from an external unit when all the data is written in an enternal memory unit, a power supply can be turned OFF after writing certainly all the data which a personal computer sends in an enternal memory unit.
[0021](3) The invention according to claim 3 releases said internal switch from said 2nd interface, when there is no command over said enternal memory unit in fixed time, and it turns OFF a power supply.
[0022]From the 2nd interface, if constituted in this way, when there is no demand to an enternal memory unit in fixed time, a power supply can be turned OFF and useless power consumption of an enternal memory unit can be held down.
[0023](4) When the state where said enternal memory unit is a removable media drive unit, and these media are not contained in an enternal memory unit carries out fixed time lapse of the invention according to claim 4, it releases said internal switch and turns OFF a power supply.
[0024]If constituted in this way, when the state where a removable media is not contained in an enternal memory unit continues fixed time, useless power consumption of an enternal memory unit can be held down by turning OFF a power supply.
[0025](5) a time check which the invention according to claim 5 figures out for time — if a means is provided and it becomes at regular time, a power supply will be made one or will be turned OFF If constituted in this way, it can cooperate with a backup program of a personal computer, and automatic backup can be performed.
[0026](6) The invention according to claim 6 publishes a command which is in said 1st interface at the time of a power turn when said Out switch is pushed, If a specific response returns from said enternal memory unit, selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be directed via said 2nd interface.
[0027]If constituted in this way, after a specific response returns from an enternal memory unit, selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be set up from a personal computer, and OFF control of a power supply as occasion demands can be performed.
[0028](7) At the time of a power turn, the invention according to claim 7 carries out the fixed time check of the thing without a command over said enternal memory unit from said 2nd interface, when said Out switch is pushed, If a command in said 1st interface is published and a specific response returns from an enternal memory unit when there is no fixed time, selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be directed via the 2nd interface.
[0029]If constituted in this way, when there will be no fixed time command in an enternal memory unit, After a specific response returns from an enternal memory unit, selection and time setting of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be carried out from a personal computer, and OFF control of a power supply as occasion demands can be performed.
[0030](8) From said 2nd interface, the invention according to claim 8 can direct selection of whether to turn OFF a power supply via the 2nd interface, when there is no demand to said enternal memory unit in fixed time.
[0031]Since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when there is no demand to an enternal memory unit in fixed time if constituted in this way, OFF control of a power supply as occasion demands can be performed.
[0032](9) Said enternal memory unit of the invention according to claim 9 is a removable media drive unit, When the state where these media are not contained in an enternal memory unit carries out fixed time lapse, selection of whether to turn OFF a power supply can be directed via said 2nd interface.
[0033]Since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when are constituted in this way and the state where a removable media is not contained in an enternal memory unit carries out fixed time lapse, OFF control of a power supply as occasion demands can be performed.

[0034](10) The invention according to claim 10 can direct setting out of regular time via said 2nd interface. If constituted in this way, setting out of regular time can be directed from a personal computer, and on-off control of a power supply as occasion demands can be performed.
[0035](11) When said Out switch is pushed at the time of a power turn as for the invention according to claim 11, notify said control device to an external device through the 2nd interface, and it turns OFF a power supply with directions of this external device.
[0036]If constituted in this way, OFF control of a power supply can be performed from an external device.
[0037]
[-- an embodiment of the invention -- example] referring to drawings hereafter -- an embodiment of the invention -- an example is explained in detail. Drawing 1 is a block diagram showing an example of 1 embodiment of this invention. The same thing as drawing 12 attaches and shows the same numerals. It differs in that an example of an embodiment shown in a figure changed a point that the internal switch 35 was added to a lineblock diagram of drawing 12, and Out switch 22 to what is shown in Drawing 4 from what turns current on and off, and other components are the same as drawing 11. The enternal memory unit (for example, MO drive) 10 and the bridge system 20 are connected in the SCSI cable 25 and the power supply line 36.
[0038]The bridge system 20 is [from the power supply 4] on via the power supply jack 21. As for the power supply included in the bridge system 20, the power supply for operation of the bridge system 20 is created by the power supply 29 for bridges. On the other hand, the enternal memory unit 10 is [which was turned on from the power supply jack 21] on via the power supply line 36 via the internal switch 35.
[0039]The personal computer 1 is connected with USB controller 27 via the connector 23. This USB controller 27 is connected with SCSI controller 26 via the data bus 30. The control device 28 is connected with SCSI controller 26 and USB controller 27 via the data bus 30. From the control device 28, the on-off control signal 2g is outputted to the internal switch 35.
[0040]The electric power switch (Out switch) 22 gives the signal of low AKUCHIBU to the control device 28, as shown in drawing 4. That is, when Out switch 22 is pushed, the signal of the "L" level is given to the control device 28. 5 is LED controlled from the control device (henceforth CPU) 28. This LED5 displays power supply turning on and off.
[0041]The command sent through a USB cable from the personal computer 1, data, etc. are changed into the form which can be processed by CPU28 from a USB protocol with USB controller 27. This is changed and sent to the form that CPU28 can treat SCSI controller 26. SCSI controller 26 is changed into a SCSI protocol, and is sent to the enternal memory unit 10. The command and data transfer to the personal computer 1 from the enternal memory unit 10 follow the reverse. Thus, the inverter described by claim 1 shows USB controller 27, SCSI controller 26, and CPU28 here. It will be as follows if operation of the device constituted in this way is explained referring to the flow chart of drawing 2.
[0042]Drawing 2 is a flow chart which shows the 1st example of this invention of operation. If the power supply 4 is connected to the bridge system 20 (S11), a power supply will be supplied from the power supply 29 for bridges, and CPU28 will start operation. CPU28 initializes the bridge system 20 (S12). Then, CPU28 waits to push Out switch 22 (S13).
[0043]If Out switch 22 is pushed, CPU28 will make the internal switch 35 one, will supply a power supply to the enternal memory unit 10 (S14), and will turn on LED5 (S15). It can recognize that the power supply was turned on because this LED5 lights up.
[0044]Then, CPU28 performs bridge operation using USB controller 27 and SCSI controller 26, and makes the personal computer 1 and the enternal memory unit 10 communicate well (S16). If Out switch 22 is pushed when the internal switch 35 is one (S17), CPU28 will go into post-processing for power OFF (S18).
[0045]In post-processing, an operator is told about CPU28 having blinked LED5 and having gone into post-processing (S21). Then, the fixed time check of whether there is any data copy request from the personal computer 1 is carried out (S22). The data sent from the personal computer 1 is divided and sent to a small block. Therefore, it is necessary to confirm whether sending out of all the data of the personal computer 1 finished with Step S22.

[0046]When there are data transfer requests again from the personal computer 1, it returns to Step S16 and bridge operation is performed. When there are no data transfer requests, it is confirmed whether CPU28 left for 1 second, using a soft timer (S23). When there are no data transfer requests of 1 seconds or more, CPU28 publishes a command command specific next to the enternal memory unit 10 via SCSI controller 26 (S24).
[0047]When the enternal memory unit 10 has cash as the reason, It is because it tells that processing ended the enternal memory unit 10 via SCSI controller 26 to the bridge system 20 even if writing processing is not completed to nonvolatile memory (actual HD, MO, and the CD itself).
[0048]CPU28 which received this processing terminating notice needs to recognize that all the data that should be written in the cash (not shown) in the enternal memory unit 10 was assembled, and needs to detect that the writing to the storage was completed certainly next. Therefore, for example, CPU28 publishes a spin down (Spindown) command, when the 1st interface is SCSI (S24). Here, a spin down command is a signal for stopping rotation of MO, for example. CPU (not shown) in the enternal memory unit 10 returns GOOD KONDESHON to the bridge system 20, after the data writing to a storage is completed in response to a spin down command. Here, a command is not limited only to a spin down. Ejection may be sufficient as long as it is a removable media drive unit. However, finally media are discharged.
[0049]If GOOD KONDESHON returns from the enternal memory unit 10 (S25), CPU28 will turn OFF LED5 (S26) and will turn OFF the internal switch 35 (S27). In this state, the current supply to the enternal memory unit 10 is severed. Next, it returns to Step S13 and waits to push Out switch 22.
[0050]Since a power supply will be turned OFF if according to this example of an embodiment the specific response (here GOOD KONDESHON) to which it comes on the contrary is received from the enternal memory unit 10 when all the data is written in the enternal memory unit 10, A power supply can be turned OFF after writing certainly all the data which the personal computer 1 sends in the enternal memory unit 10.
[0051]Drawing 3 is a block diagram showing the 2nd example of an embodiment of this invention. The same thing as drawing 1 attaches and shows the same numerals. This example of an embodiment shows the circuit at the time of using an ATAPI interface as the enternal memory unit 10. In this case, the 1st interface controller as shown in drawing 1 becomes unnecessary. It is connected with the connector 23 via the interface part 33, and the interface controller 27 is connected with the personal computer 1.
[0052]Here, the thing for IEEE1394 is used as the interface controller 27. Since the communication wire for IEEE1394 contains the line for power supplies in an inside, when a power supply can be supplied from the personal computer 1, the power source wire is also connected with the connector 23. In this case, a power supply is connected to a power source line via the diode D2 for prevention of backflow. On the other hand, the power supply from the power supply 4 is also connected to the power source line via the diode D1 for prevention of backflow via the power supply jack 21. As a result, the power supply for operating the bridge system 20 can be supplied from the personal computer 1 and power supply 4 side, and the parallel run of a power supply becomes possible via the diode D1 for prevention of backflow, and D2.
[0053]The control device (CPU) 28 is connected with the interface controller 27 and the ATAPI interface 24 via the data bus 30. In the system constituted in this way, the case where the power supply 29 for bridges is supplied by the ON signal from Out switch 22 is considered. When the data writing demand to the enternal memory unit 10 from the personal computer 1 occurs, the data based on IEEE1394 from the personal computer 1, It can go into the interface controller 27 via the interface part 33, the control signal for an interface can be exchanged between CPU28, and the data of IEEE1394 conformity can be changed into the data of ATAPI. The data changed into ATAPI form is once stored in the cash of the enternal memory unit 10, and is written in a storage after that.
[0054]Here, cash's memory of all the data will output a processing end signal to it from the enternal memory unit 10 to the bridge system 20. CPU28 which received this processing end signal publishes a specific command (for example, Spindown) to the enternal memory unit 10. In

the enternal memory unit 10 which received this command, when the data writing to a storage is completed, a data writing completion (GOOD KONDESHON) signal is outputted from internal CPU. If this GOOD KONDESHON signal is received, CPU28 will control the internal switch 35 and will release a point of contact. Thereby, the power supply currently supplied to the enternal memory unit 10 becomes **.

[0055]Since a power supply will be turned OFF if also in this example of an embodiment the specific response (here GOOD KONDESHON) to which it comes on the contrary is received from the enternal memory unit 10 when all the data is written in the enternal memory unit 10, A power supply can be turned OFF after writing certainly all the data which the personal computer 1 sends in the enternal memory unit 10.

[0056]According to the example of an embodiment mentioned above, it is effective in the ability to carry out without the above-mentioned power control needing change for the software of the existing enternal memory unit or a personal computer. Drawing 5 is a block diagram showing the 3rd example of an embodiment of this invention. The same thing as drawing 1 attaches and shows the same numerals. In the figure, 37 is the timer formed in the bridge system 20, and is connected with CPU28. This timer 37 clocks time and is backed up with the battery. Therefore, even if the power supply of a circuit becomes **, the timer 37 continues mincing time. Other composition is completely the same as the composition of drawing 1. Operation of this invention is explained using the system constituted in this way.

[0057]Drawing 6 is a flow chart which shows the 2nd example of this invention of operation. If the power supply 4 is connected with the bridge system 20 (S11), a power supply will be supplied from the power supply 29 for bridges, and CPU28 will start operation. CPU28 initializes the bridge system 20 (S12). Then, CPU28 waits to push Out switch 22 (S13).

[0058]If Out switch 22 is pushed, it will supply a power supply to the enternal memory unit 10 (S14), and will turn on LED5 (S15). [CPU28] [the internal switch 35] Then, CPU28 performs bridge operation using SCSI controller 26 and USB controller 27, and makes the personal computer 1 and the enternal memory unit 10 communicate well (S16).

[0059]Next, after bridge operation is completed, CPU28 goes the time of the timer 37 to reading. On the other hand, CPU28 confirms whether Out switch 22 was pushed (S17a). When Out switch 22 is pushed, it goes into post-processing (S18). When Out switch 22 is not pushed, CPU28 counts time without access from the personal computer 1 using the timer 37 (S17b). That is, time when there is finally access is read and subsequent lapsed time will be counted. When there is access from the personal computer 1, CPU28 disregards the read time information.

[0060]When there is access from the personal computer 1, it returns to Step 16 and bridge operation is performed. When the state where there is no access from the personal computer 1 passes for 15 minutes, CPU28 goes into post-processing (S18). Post-processing is the completely same processing as post-processing shown in drawing 2. The connection from ** of a figure and ** also corresponds with the sequence of post-processing of drawing 2.

[0061]According to this example of an embodiment, from the 2nd interface, when there is no demand to an enternal memory unit in fixed time, a power supply can be turned OFF and the useless power consumption of an enternal memory unit can be held down.

[0062]Drawing 7 is a flow chart which shows the 3rd example of this invention of operation. Drawing 5 is used as a system configuration. If the power supply 4 is connected with the bridge system 20 (S11), a power supply will be supplied from the power supply 29 for bridges, and CPU28 will start operation. CPU28 initializes the bridge system 20 (S12). Then, CPU28 waits to push Out switch 22 (S13).

[0063]If Out switch 22 is pushed, it will supply a power supply to the enternal memory unit 10 (S14), and will turn on LED5 (S15). [CPU28] [the internal switch 35] Then, CPU28 performs bridge operation using SCSI controller 26 and USB controller 27, and makes the personal computer 1 and the enternal memory unit 10 communicate well (S16).

[0064]Next, after bridge operation is completed, CPU28 confirms whether Out switch 22 was pushed (S17a). In this case, CPU28 memorizes the time which had the last access from the personal computer 1. When Out switch 22 is pushed, it goes into post-processing (S18). When Out switch 22 is not pushed, it is confirmed whether those without access from the personal

computer 1 passed for 15 minutes (S17b). CPU28 goes to read the time information of the timer 37, and the passage of time for these 15 minutes is counted by deducting time with the last access from said personal computer 1.

[0065]When those without access from the personal computer 1 pass for 15 minutes, it goes into post-processing (S18). When those without access from the personal computer 1 do not pass for 15 minutes, CPU28 confirms whether those without a removable media (it abbreviates to media below) passed for 5 minutes (S17c). In this case, CPU28 will not go to read the timer 37, if media are inserted. And if media are drawn out, CPU28 will go to read the timer 37 and will memorize the time at that time. And if those without media pass for 5 minutes, it will go into post-processing (S18). The sequence of post-processing is completely the same as that of what was shown in drawing 2. The connection from ** of a figure and ** also corresponds with the sequence of post-processing of drawing 2.

[0066]According to this example of an embodiment, when the state where the removable media is not contained in the enternal memory unit 10 continues beyond in fixed time, the useless power consumption of the enternal memory unit 10 can be held down by turning OFF a power supply.

[0067]Drawing 8 is a flow chart which shows the 4th example of this invention of operation. Drawing 5 is used as a system configuration. If the power supply 4 is connected with the bridge system 20 (S11), a power supply will be supplied from the power supply 29 for bridges, and CPU28 will start operation. In this case, the reserved period shall be beforehand memorized by CPU28. CPU28 initializes the bridge system 20 (S12). Then, CPU28 waits to push Out switch 22 (S13a). When Out switch 22 is pushed, it progresses to the processing after Step S14.

[0068]When Out switch 22 is not pushed, it waits to push Out switch 22. If it goes to read the timer 37 in the meantime and the time of the timer 37 becomes a reserved period, CPU28 will detect that and will make the internal switch 35 one (S13). As a result, a power supply comes to be supplied to the enternal memory unit 10. Simultaneously, LED5 is turned on (S15). Then, CPU28 performs bridge operation using SCSI controller 26 and USB controller 27, and makes the personal computer 1 and the enternal memory unit 10 communicate well (S16).

[0069]Next, after bridge operation is completed, CPU28 confirms whether Out switch 22 was pushed (S17a). In this case, CPU28 memorizes the time which had the last access from the personal computer 1. When Out switch 22 is pushed, it goes into post-processing (S18). When Out switch 22 is not pushed, it is confirmed whether those without access from the personal computer 1 passed for 15 minutes (S17b). CPU28 goes to read the time information of the timer 37, and the passage of time for these 15 minutes is counted by deducting time with the last access from said personal computer 1.

[0070]When those without access from the personal computer 1 pass for 15 minutes, it goes into post-processing (S18). When those without access from the personal computer 1 do not pass for 15 minutes, CPU28 confirms whether those without a removable media (it abbreviates to media below) passed for 5 minutes (S17c). In this case, CPU28 will not go to read the timer 37, if media are inserted. And if media are drawn out, CPU28 will go to read the timer 37 and will memorize the time at that time. And if those without media pass for 5 minutes, it will go into post-processing (S18). The sequence of post-processing is completely the same as that of what was shown in drawing 2. The connection from ** of a figure and ** also corresponds with the sequence of post-processing of drawing 2.

[0071]According to this example of an embodiment, it can cooperate with the backup program of the personal computer 1, and automatic backup can be performed. Drawing 9 is a flow chart which shows the 5th example of this invention of operation. It enables it to perform OFF control of the power supply of an external storage from an external device (for example, personal computer) in this example of an embodiment. The figure shows post-processing and is the same as that of what mentioned post-processing already. In an old invention, although the control device (CPU) 28 had published the command of the spin down, by this invention, it is made to publish the command of a spin down from the external device (for example, personal computer) side. The personal computer side also directs permission of power OFF. Drawing 1 is used as a system configuration.

[0072]If it goes into post-processing (S20), it will tell having blinked LED5 and having gone into post-processing (S21). If Out switch 22 is pushed, CPU28 will report that the switch was pushed on the personal computer 1 through the 2nd interface (USB interface) (S23).
[0073]It continues bridge operation until CPU28 has directions of power OFF from the personal computer 1 (S24, S25). The personal computer 1 will publish a spin down command to an external storage, if it finishes discharging all the data. If GOOD KONDESHON comes on the contrary from an external storage, it can recognize that all the data was written in nonvolatile memory, and power OFF will be directed to CPU28 of an external storage (S24, S25). CPU28 turns OFF LED5 in response to the directions from the personal computer 1 (S26), releases the internal switch 35, and turns OFF a power supply (S27).
[0074]According to this example of an embodiment, OFF control of a power supply can be performed from an external device (for example, personal computer). In this invention, utiilty software etc. are operated from a personal computer and it does not carry out whether the function of an invention mentioned above is used, or a user chooses or directions of setting out of waiting time can be performed.
[0075]For example, the command which is in said 1st interface (SCSI interface) at the time of a power turn when Out switch 22 is pushed is published, a power supply is turned OFF, immediately after turning OFF a power supply or pushing Out switch 22, if a specific response returns from said enternal memory unit 10 -- a user can direct that selection via said 2nd interface -- it can be made like.
[0076]If constituted in this way, after a specific response returns from the enternal memory unit 10, selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after Out switch 22 is pushed can be set up from the personal computer 1, and OFF control of a power supply as occasion demands can be performed.
[0077]At the time of a power turn, when Out switch 22 is pushed, the fixed time check of the thing without the command over said enternal memory unit 10 is carried out from said 2nd interface (USB interface), The command which is in said 1st interface when there is no fixed time is published, When a specific response returns from the enternal memory unit 10, it can make it possible to direct selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after Out switch 22 is pushed via the 2nd interface.
[0078]If constituted in this way, when there will be no fixed time command in the enternal memory unit 10, After a specific response returns from the enternal memory unit 10, selection and time setting of whether a power supply is turned OFF or to turn OFF a power supply, immediately after Out switch 22 is pushed can be carried out from the personal computer 1, and OFF control of a power supply as occasion demands can be performed.
[0079]When there is no demand to said enternal memory unit 10 in fixed time, it can make it possible to direct selection of whether to turn OFF a power supply, and setting out of fixed time via the 2nd interface from the 2nd interface (USB interface).
[0080]Since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when there is no demand to the enternal memory unit 10 in fixed time if constituted in this way, OFF control of a power supply as occasion demands can be performed.

[0081]The enternal memory unit 10 is a removable media, and when the state where these media are not contained in the enternal memory unit 10 carries out fixed time lapse, it can make it possible to direct selection of whether to turn OFF a power supply via said 2nd interface.
[0082]Since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when are constituted in this way and the state where the removable media is not contained in the enternal memory unit carries out fixed time lapse, OFF control of a power supply as occasion demands can be performed.
[0083]It can make it possible to direct setting out of the regular time via said 2nd interface. If constituted in this way, setting out of the regular time can be directed from a personal computer, and on-off control of a power supply as occasion demands can be performed.
[0084]
[Effect of the Invention]As mentioned above, according to this invention, the following effects

are acquired as explained in detail.
(1) According to the invention according to claim 1, since a power supply will be turned OFF if the specific response to which it comes on the contrary is received from an enternal memory unit when all the data is written in an enternal memory unit, a power supply can be turned OFF after writing data in an enternal memory unit certainly.
[0085](2) According to the invention according to claim 2, in fixed time, the command over said enternal memory unit from the 2nd interface when there is nothing, Since a power supply will be turned OFF if the specific response to which it comes on the contrary is received from an external unit when all the data is written in an enternal memory unit, a power supply can be turned OFF after writing certainly all the data which a personal computer sends in an enternal memory unit.
[0086](3) According to the invention according to claim 3, from the 2nd interface, when there is no demand to an enternal memory unit in fixed time, a power supply can be turned OFF and the useless power consumption of an enternal memory unit can be held down.
[0087](4) According to the invention according to claim 4, when the state where the removable media is not contained in the enternal memory unit continues fixed time, the useless power consumption of an enternal memory unit can be held down by turning OFF a power supply.
[0088](5) According to the invention according to claim 5, it can cooperate with the backup program of a personal computer, and automatic backup can be performed.
(6) According to the invention according to claim 6, after a specific response returns from an enternal memory unit, selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be set up from a personal computer, and OFF control of a power supply as occasion demands can be performed.
[0089](7) When there is no fixed time command in an enternal memory unit according to the invention according to claim 7, After a specific response returns from an enternal memory unit, selection and time setting of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be carried out from a personal computer, and OFF control of a power supply as occasion demands can be performed.
[0090](8) According to the invention according to claim 8, since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when there is no demand to an enternal memory unit in fixed time, OFF control of a power supply as occasion demands can be performed.
[0091](9) According to the invention according to claim 9, since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when the state where the removable media is not contained in the enternal memory unit carries out fixed time lapse, OFF control of a power supply as occasion demands can be performed.
[0092](10) According to the invention according to claim 10, setting out of the regular time can be directed from a personal computer, and on-off control of a power supply as occasion demands can be performed.
(11) According to the invention according to claim 11, OFF control of a power supply can be performed from an external device.
[0093]Thus, according to this invention, after writing data in an enternal memory unit certainly, the control circuit of the external storage which can turn OFF a power supply can be provided. It can carry out without the above-mentioned power control needing change for the software of the existing enternal memory unit.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention]This invention relates to the control circuit of external memory storage, such as a personal computer (it abbreviates to a personal computer or PC below), in more detail about the control circuit of an external storage.

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PRIOR ART

[Description of the Prior Art]The external storage of the personal computer MO (optical-magnetic disc equipment), HDD (hard disk unit), and CD-R/W with modern interfaces, such as USB and IEEE1394, has appeared briskly. Drawing 10 is a figure showing a personal computer and an external storage. In the figure, 1 is a personal computer and is connected with the external storage 2 via USB cable 3.
[0003]Many of these external storages have many which have added the bridge system to the enternal memory unit (what is called a built-in MO drive, HDD, CD-R/W) with interfaces, such as the existing ATAPI and SCSI. The reason is as follows.
[0004]** Development of an enternal memory unit with a new interface and mass production take immense expense and period.
** At present, it cannot be decided which [of a new interface] becomes in use.
[0005]Since it is above, it is because a merit has many directions which develop or purchase the bridge system which changes ATAPI and SCSI into USB, IEEE1394, etc., and carry out external [of this].
[0006]Drawing 11 is a figure showing the example of appearance composition of USB or an external storage with an IEEE1394 interface. The conventional enternal memory unit 10 is made available by adding the bridge system 20 to the conventional enternal memory unit 10. The bridge system 20 is realized by attaching various kinds of necessary parts to a substrate. In the bridge system 20, a power supply jack and 22, an electric power switch and 23 are the interfaces of SCSI, ATAPI, etc., and 21 is connected with the bridge system 20 for connectors, such as USB and IEEE1394, and 24. Thus, the existing SCSI and the storage unit using an ATAPI interface can be used as USB and memory storage corresponding to IEEE1394 by forming a bridge system.
[0007]Improvement in the speed of an enternal memory unit is also desired with improvement in the speed of a personal computer, and improvement in the speed of an interface. Then, by collecting MO, HDD, and the data that stacks the high-speed semiconductor memory called the quick cash of access, and is transmitted from CD-R/W here temporarily, access as an external storage can be seemingly made quick, and a personal computer can be released early.
[0008]Drawing 12 is a block diagram showing the example of the conventional composition of USB or an external storage with an IEEE1394 interface. The same thing as drawing 10 attaches and shows the same numerals. The enternal memory unit 10 and the bridge system 20 are connected via the cable 25. 24 is a SCSI interface to which the cable 25 is connected.
[0009]In the bridge system 20, it is a USB controller (the 2nd interface controller) by which 26 is connected with a SCSI controller (the 1st interface controller), and 27 is connected with this SCSI controller 26. 28 is a control device which connects between SCSI controller 26 and USB controller 27 via the data bus 30. As this control device 28, CPU is used, for example.
[0010]2j is the 1st interface signal that flows between SCSI controller 26 and SCSI interface 24. 1 is a personal computer and is connected with USB connector 23. 2k is the 2nd interface signal that flows between USB controller 27 and USB connector 23.
[0011]It is a power supply jack to which a power supply is connected to 4 and this power supply 4 is connected 21. The power supply inputted from this power supply jack 21 is supplied to the

inside of a bridge system via the electric power switch 22. 29 is a power supply for bridges. The power for operating the bridge system 20 from this power supply 29 is supplied. A power supply is supplied also to the enternal memory unit 10 side via the connector 31, the connector 32, and the power supply line 36.

[0012]In the device constituted in this way, the control device 28 performs the interconversion between a USB interface and a SCSI interface via the control signal 2h for the 1st interface and the control signal 2i for the 2nd interface, and the data bus 30. Thereby, the data from the personal computer 1 goes into the bridge system 20 from USB controller 27, is changed into the data for SCSI interfaces, and is written in the enternal memory unit 10. That is, it becomes possible to write data to the enternal memory unit 10 using the conventional SCSI interface using a USB interface.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention]As mentioned above, according to this invention, the following effects are acquired as explained in detail.
(1) According to the invention according to claim 1, since a power supply will be turned OFF if the specific response to which it comes on the contrary is received from an enternal memory unit when all the data is written in an enternal memory unit, a power supply can be turned OFF after writing data in an enternal memory unit certainly.
[0085](2) According to the invention according to claim 2, in fixed time, the command over said enternal memory unit from the 2nd interface when there is nothing, Since a power supply will be turned OFF if the specific response to which it comes on the contrary is received from an external unit when all the data is written in an enternal memory unit, a power supply can be turned OFF after writing certainly all the data which a personal computer sends in an enternal memory unit.
[0086](3) According to the invention according to claim 3, from the 2nd interface, when there is no demand to an enternal memory unit in fixed time, a power supply can be turned OFF and the useless power consumption of an enternal memory unit can be held down.
[0087](4) According to the invention according to claim 4, when the state where the removable media is not contained in the enternal memory unit continues fixed time, the useless power consumption of an enternal memory unit can be held down by turning OFF a power supply.
[0088](5) According to the invention according to claim 5, it can cooperate with the backup program of a personal computer, and automatic backup can be performed.
(6) According to the invention according to claim 6, after a specific response returns from an enternal memory unit, selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be set up from a personal computer, and OFF control of a power supply as occasion demands can be performed.
[0089](7) When there is no fixed time command in an enternal memory unit according to the invention according to claim 7, After a specific response returns from an enternal memory unit, selection and time setting of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be carried out from a personal computer, and OFF control of a power supply as occasion demands can be performed.
[0090](8) According to the invention according to claim 8, since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when there is no demand to an enternal memory unit in fixed time, OFF control of a power supply as occasion demands can be performed.
[0091](9) According to the invention according to claim 9, since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when the state where the removable media is not contained in the enternal memory unit carries out fixed time lapse, OFF control of a power supply as occasion demands can be performed.
[0092](10) According to the invention according to claim 10, setting out of the regular time can be directed from a personal computer, and on-off control of a power supply as occasion demands can be performed.
(11) According to the invention according to claim 11, OFF control of a power supply can be

performed from an external device.
[0093]Thus, according to this invention, after writing data in an enternal memory unit certainly, the control circuit of the external storage which can turn OFF a power supply can be provided. It can carry out without the above-mentioned power control needing change for the software of the existing enternal memory unit.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]USB and IEEE1394 have a hot plug function (function which can turn OFF a power supply when not using it), and when not using apparatus, they can cut a power supply at any time. However, the enternal memory unit with said cash will notify the completion of a copy to the personal computer 1, if all the file transfers are completed including the part collected on cash when a big file is copied from the personal computer 1.
[0014]It tells that the personal computer 1 carried out a display or non-display ** of the dialog etc. on the screen, and the copy ended it to the user. However, since write-in work is not actually completed only by being actually stocked by cash, if a power supply is turned OFF at this time, message data collected on cash will disappear.
[0015]In order to prevent such an accident, there is art given in JP,8-95715,A. However, in this invention, a busy announcement means is needed also for the enternal memory unit 10.
Therefore, the problem of being inapplicable is among the enternal memory units which attached the bridge system to said existing enternal memory unit 10.
[0016]This invention is made in view of such a technical problem, and it aims at providing the control circuit of the external storage which can turn OFF a power supply after writing data in the existing enternal memory unit certainly.

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MEANS

[Means for Solving the Problem](1) An enternal memory unit in which the invention according to claim 1 memorizes data, The 1st interface connected with this enternal memory unit, and the 2nd interface for connecting with an external instrument, A device which changes a data format of this 1st interface and the 2nd interface, A control device which controls the whole operation, and an internal switch for supplying a power supply to said enternal memory unit, Provide an Out switch which gives an on-off signal of a power supply, and if it detects that said Out switch was pushed at the time of a power turn, said control device, If a command in the 1st interface is published and a specific response returns from an enternal memory unit, said internal switch will be released and a power supply will be turned OFF.
[0018]Since a power supply will be turned OFF if are constituted in this way and a specific response to which it comes on the contrary will be received from an enternal memory unit when all the data is written in an enternal memory unit, a power supply can be turned OFF after writing data in an enternal memory unit certainly.
[0019](2) If it detects that said Out switch was pushed at the time of a power turn, the invention according to claim 2 said control device, The fixed time check of the thing without a command or data to said said enternal memory unit from the 2nd interface is carried out, If a command in said 1st interface is published and a specific response returns from an enternal memory unit when there is no fixed time, said internal switch will be released and a power supply will be turned OFF.
[0020]If constituted in this way, in fixed time, a command over said enternal memory unit from the 2nd interface when there is nothing, Since a power supply will be turned OFF if a specific response to which it comes on the contrary is received from an external unit when all the data is written in an enternal memory unit, a power supply can be turned OFF after writing certainly all the data which a personal computer sends in an enternal memory unit.
[0021](3) The invention according to claim 3 releases said internal switch from said 2nd interface, when there is no command over said enternal memory unit in fixed time, and it turns OFF a power supply.
[0022]From the 2nd interface, if constituted in this way, when there is no demand to an enternal memory unit in fixed time, a power supply can be turned OFF and useless power consumption of an enternal memory unit can be held down.
[0023](4) When the state where said enternal memory unit is a removable media drive unit, and these media are not contained in an enternal memory unit carries out fixed time lapse of the invention according to claim 4, it releases said internal switch and turns OFF a power supply.
[0024]If constituted in this way, when the state where a removable media is not contained in an enternal memory unit continues fixed time, useless power consumption of an enternal memory unit can be held down by turning OFF a power supply.
[0025](5) a time check which the invention according to claim 5 figures out for time -- if a means is provided and it becomes at regular time, a power supply will be made one or will be turned OFF If constituted in this way, it can cooperate with a backup program of a personal computer, and automatic backup can be performed.
[0026](6) The invention according to claim 6 publishes a command which is in said 1st interface

at the time of a power turn when said Out switch is pushed, If a specific response returns from said enternal memory unit, selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be directed via said 2nd interface.
[0027]If constituted in this way, after a specific response returns from an enternal memory unit, selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be set up from a personal computer, and OFF control of a power supply as occasion demands can be performed.
[0028](7) At the time of a power turn, the invention according to claim 7 carries out the fixed time check of the thing without a command over said enternal memory unit from said 2nd interface, when said Out switch is pushed, If a command in said 1st interface is published and a specific response returns from an enternal memory unit when there is no fixed time, selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be directed via the 2nd interface.
[0029]If constituted in this way, when there will be no fixed time command in an enternal memory unit, After a specific response returns from an enternal memory unit, selection and time setting of whether a power supply is turned OFF or to turn OFF a power supply, immediately after an Out switch is pushed can be carried out from a personal computer, and OFF control of a power supply as occasion demands can be performed.
[0030](8) From said 2nd interface, the invention according to claim 8 can direct selection of whether to turn OFF a power supply via the 2nd interface, when there is no demand to said enternal memory unit in fixed time.
[0031]Since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when there is no demand to an enternal memory unit in fixed time if constituted in this way, OFF control of a power supply as occasion demands can be performed.
[0032](9) Said enternal memory unit of the invention according to claim 9 is a removable media drive unit, When the state where these media are not contained in an enternal memory unit carries out fixed time lapse, selection of whether to turn OFF a power supply can be directed via said 2nd interface.
[0033]Since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when are constituted in this way and the state where a removable media is not contained in an enternal memory unit carries out fixed time lapse, OFF control of a power supply as occasion demands can be performed.
[0034](10) The invention according to claim 10 can direct setting out of regular time via said 2nd interface. If constituted in this way, setting out of regular time can be directed from a personal computer, and on-off control of a power supply as occasion demands can be performed.
[0035](11) When said Out switch is pushed at the time of a power turn as for the invention according to claim 11, notify said control device to an external device through the 2nd interface, and it turns OFF a power supply with directions of this external device.
[0036]If constituted in this way, OFF control of a power supply can be performed from an external device.
[0037]
[-- an embodiment of the invention -- example] referring to drawings hereafter -- an embodiment of the invention -- an example is explained in detail. Drawing 1 is a block diagram showing an example of 1 embodiment of this invention. The same thing as drawing 12 attaches and shows the same numerals. It differs in that an example of an embodiment shown in a figure changed a point that the internal switch 35 was added to a lineblock diagram of drawing 12, and Out switch 22 to what is shown in Drawing 4 from what turns current on and off, and other components are the same as drawing 11. The enternal memory unit (for example, MO drive) 10 and the bridge system 20 are connected in the SCSI cable 25 and the power supply line 36.
[0038]The bridge system 20 is [from the power supply 4] on via the power supply jack 21. As for the power supply included in the bridge system 20, the power supply for operation of the bridge system 20 is created by the power supply 29 for bridges. On the other hand, the enternal memory unit 10 is [which was turned on from the power supply jack 21] on via the power supply line 36 via the internal switch 35.

[0039]The personal computer 1 is connected with USB controller 27 via the connector 23. This USB controller 27 is connected with SCSI controller 26 via the data bus 30. The control device 28 is connected with SCSI controller 26 and USB controller 27 via the data bus 30. From the control device 28, the on-off control signal 2g is outputted to the internal switch 35.
[0040]The electric power switch (Out switch) 22 gives the signal of low AKUCHIBU to the control device 28, as shown in drawing 4. That is, when Out switch 22 is pushed, the signal of the "L" level is given to the control device 28. 5 is LED controlled from the control device (henceforth CPU) 28. This LED5 displays power supply turning on and off.
[0041]The command sent through a USB cable from the personal computer 1, data, etc. are changed into the form which can be processed by CPU28 from a USB protocol with USB controller 27. This is changed and sent to the form that CPU28 can treat SCSI controller 26. SCSI controller 26 is changed into a SCSI protocol, and is sent to the enternal memory unit 10. The command and data transfer to the personal computer 1 from the enternal memory unit 10 follow the reverse. Thus, the inverter described by claim 1 shows USB controller 27, SCSI controller 26, and CPU28 here. It will be as follows if operation of the device constituted in this way is explained referring to the flow chart of drawing 2.
[0042]Drawing 2 is a flow chart which shows the 1st example of this invention of operation. If the power supply 4 is connected to the bridge system 20 (S11), a power supply will be supplied from the power supply 29 for bridges, and CPU28 will start operation. CPU28 initializes the bridge system 20 (S12). Then, CPU28 waits to push Out switch 22 (S13).
[0043]If Out switch 22 is pushed, CPU28 will make the internal switch 35 one, will supply a power supply to the enternal memory unit 10 (S14), and will turn on LED5 (S15). It can recognize that the power supply was turned on because this LED5 lights up.
[0044]Then, CPU28 performs bridge operation using USB controller 27 and SCSI controller 26, and makes the personal computer 1 and the enternal memory unit 10 communicate well (S16). If Out switch 22 is pushed when the internal switch 35 is one (S17), CPU28 will go into post-processing for power OFF (S18).
[0045]In post-processing, an operator is told about CPU28 having blinked LED5 and having gone into post-processing (S21). Then, the fixed time check of whether there is any data copy request from the personal computer 1 is carried out (S22). The data sent from the personal computer 1 is divided and sent to a small block. Therefore, it is necessary to confirm whether sending out of all the data of the personal computer 1 finished with Step S22.
[0046]When there are data transfer requests again from the personal computer 1, it returns to Step S16 and bridge operation is performed. When there are no data transfer requests, it is confirmed whether CPU28 left for 1 second, using a soft timer (S23). When there are no data transfer requests of 1 seconds or more, CPU28 publishes a command command specific next to the enternal memory unit 10 via SCSI controller 26 (S24).
[0047]When the enternal memory unit 10 has cash as the reason, It is because it tells that processing ended the enternal memory unit 10 via SCSI controller 26 to the bridge system 20 even if writing processing is not completed to nonvolatile memory (actual HD, MO, and the CD itself).
[0048]CPU28 which received this processing terminating notice needs to recognize that all the data that should be written in the cash (not shown) in the enternal memory unit 10 was assembled, and needs to detect that the writing to the storage was completed certainly next. Therefore, for example, CPU28 publishes a spin down (Spindown) command, when the 1st interface is SCSI (S24). Here, a spin down command is a signal for stopping rotation of MO, for example. CPU (not shown) in the enternal memory unit 10 returns GOOD KONDESHON to the bridge system 20, after the data writing to a storage is completed in response to a spin down command. Here, a command is not limited only to a spin down. Ejection may be sufficient as long as it is a removable media drive unit. However, finally media are discharged.
[0049]If GOOD KONDESHON returns from the enternal memory unit 10 (S25), CPU28 will turn OFF LED5 (S26) and will turn OFF the internal switch 35 (S27). In this state, the current supply to the enternal memory unit 10 is severed. Next, it returns to Step S13 and waits to push Out switch 22.

[0050]Since a power supply will be turned OFF if according to this example of an embodiment the specific response (here GOOD KONDESHON) to which it comes on the contrary is received from the enternal memory unit 10 when all the data is written in the enternal memory unit 10, A power supply can be turned OFF after writing certainly all the data which the personal computer 1 sends in the enternal memory unit 10.
[0051]Drawing 3 is a block diagram showing the 2nd example of an embodiment of this invention. The same thing as drawing 1 attaches and shows the same numerals. This example of an embodiment shows the circuit at the time of using an ATAPI interface as the enternal memory unit 10. In this case, the 1st interface controller as shown in drawing 1 becomes unnecessary. It is connected with the connector 23 via the interface part 33, and the interface controller 27 is connected with the personal computer 1.
[0052]Here, the thing for IEEE1394 is used as the interface controller 27. Since the communication wire for IEEE1394 contains the line for power supplies in an inside, when a power supply can be supplied from the personal computer 1, the power source wire is also connected with the connector 23. In this case, a power supply is connected to a power source line via the diode D2 for prevention of backflow. On the other hand, the power supply from the power supply 4 is also connected to the power source line via the diode D1 for prevention of backflow via the power supply jack 21. As a result, the power supply for operating the bridge system 20 can be supplied from the personal computer 1 and power supply 4 side, and the parallel run of a power supply becomes possible via the diode D1 for prevention of backflow, and D2.
[0053]The control device (CPU) 28 is connected with the interface controller 27 and the ATAPI interface 24 via the data bus 30. In the system constituted in this way, the case where the power supply 29 for bridges is supplied by the ON signal from Out switch 22 is considered. When the data writing demand to the enternal memory unit 10 from the personal computer 1 occurs, the data based on IEEE1394 from the personal computer 1, It can go into the interface controller 27 via the interface part 33, the control signal for an interface can be exchanged between CPU28, and the data of IEEE1394 conformity can be changed into the data of ATAPI. The data changed into ATAPI form is once stored in the cash of the enternal memory unit 10, and is written in a storage after that.
[0054]Here, cash's memory of all the data will output a processing end signal to it from the enternal memory unit 10 to the bridge system 20. CPU28 which received this processing end signal publishes a specific command (for example, Spindown) to the enternal memory unit 10. In the enternal memory unit 10 which received this command, when the data writing to a storage is completed, a data writing completion (GOOD KONDESHON) signal is outputted from internal CPU. If this GOOD KONDESHON signal is received, CPU28 will control the internal switch 35 and will release a point of contact. Thereby, the power supply currently supplied to the enternal memory unit 10 becomes **.
[0055]Since a power supply will be turned OFF if also in this example of an embodiment the specific response (here GOOD KONDESHON) to which it comes on the contrary is received from the enternal memory unit 10 when all the data is written in the enternal memory unit 10, A power supply can be turned OFF after writing certainly all the data which the personal computer 1 sends in the enternal memory unit 10.
[0056]According to the example of an embodiment mentioned above, it is effective in the ability to carry out without the above-mentioned power control needing change for the software of the existing enternal memory unit or a personal computer. Drawing 5 is a block diagram showing the 3rd example of an embodiment of this invention. The same thing as drawing 1 attaches and shows the same numerals. In the figure, 37 is the timer formed in the bridge system 20, and is connected with CPU28. This timer 37 clocks time and is backed up with the battery. Therefore, even if the power supply of a circuit becomes **, the timer 37 continues mincing time. Other composition is completely the same as the composition of drawing 1. Operation of this invention is explained using the system constituted in this way.
[0057]Drawing 6 is a flow chart which shows the 2nd example of this invention of operation. If the power supply 4 is connected with the bridge system 20 (S11), a power supply will be supplied from the power supply 29 for bridges, and CPU28 will start operation. CPU28 initializes the

bridge system 20 (S12). Then, CPU28 waits to push Out switch 22 (S13).
[0058]If Out switch 22 is pushed, it will supply a power supply to the enternal memory unit 10 (S14), and will turn on LED5 (S15). [CPU28] [the internal switch 35] Then, CPU28 performs bridge operation using SCSI controller 26 and USB controller 27, and makes the personal computer 1 and the enternal memory unit 10 communicate well (S16).
[0059]Next, after bridge operation is completed, CPU28 goes the time of the timer 37 to reading. On the other hand, CPU28 confirms whether Out switch 22 was pushed (S17a). When Out switch 22 is pushed, it goes into post-processing (S18). When Out switch 22 is not pushed, CPU28 counts time without access from the personal computer 1 using the timer 37 (S17b). That is, time when there is finally access is read and subsequent lapsed time will be counted. When there is access from the personal computer 1, CPU28 disregards the read time information.
[0060]When there is access from the personal computer 1, it returns to Step 16 and bridge operation is performed. When the state where there is no access from the personal computer 1 passes for 15 minutes, CPU28 goes into post-processing (S18). Post-processing is the completely same processing as post-processing shown in drawing 2. The connection from ** of a figure and ** also corresponds with the sequence of post-processing of drawing 2.
[0061]According to this example of an embodiment, from the 2nd interface, when there is no demand to an enternal memory unit in fixed time, a power supply can be turned OFF and the useless power consumption of an enternal memory unit can be held down.
[0062]Drawing 7 is a flow chart which shows the 3rd example of this invention of operation. Drawing 5 is used as a system configuration. If the power supply 4 is connected with the bridge system 20 (S11), a power supply will be supplied from the power supply 29 for bridges, and CPU28 will start operation. CPU28 initializes the bridge system 20 (S12). Then, CPU28 waits to push Out switch 22 (S13).
[0063]If Out switch 22 is pushed, it will supply a power supply to the enternal memory unit 10 (S14), and will turn on LED5 (S15). [CPU28] [the internal switch 35] Then, CPU28 performs bridge operation using SCSI controller 26 and USB controller 27, and makes the personal computer 1 and the enternal memory unit 10 communicate well (S16).
[0064]Next, after bridge operation is completed, CPU28 confirms whether Out switch 22 was pushed (S17a). In this case, CPU28 memorizes the time which had the last access from the personal computer 1. When Out switch 22 is pushed, it goes into post-processing (S18). When Out switch 22 is not pushed, it is confirmed whether those without access from the personal computer 1 passed for 15 minutes (S17b). CPU28 goes to read the time information of the timer 37, and the passage of time for these 15 minutes is counted by deducting time with the last access from said personal computer 1.
[0065]When those without access from the personal computer 1 pass for 15 minutes, it goes into post-processing (S18). When those without access from the personal computer 1 do not pass for 15 minutes, CPU28 confirms whether those without a removable media (it abbreviates to media below) passed for 5 minutes (S17c). In this case, CPU28 will not go to read the timer 37, if media are inserted. And if media are drawn out, CPU28 will go to read the timer 37 and will memorize the time at that time. And if those without media pass for 5 minutes, it will go into post-processing (S18). The sequence of post-processing is completely the same as that of what was shown in drawing 2. The connection from ** of a figure and ** also corresponds with the sequence of post-processing of drawing 2.
[0066]According to this example of an embodiment, when the state where the removable media is not contained in the enternal memory unit 10 continues beyond in fixed time, the useless power consumption of the enternal memory unit 10 can be held down by turning OFF a power supply.
[0067]Drawing 8 is a flow chart which shows the 4th example of this invention of operation. Drawing 5 is used as a system configuration. If the power supply 4 is connected with the bridge system 20 (S11), a power supply will be supplied from the power supply 29 for bridges, and CPU28 will start operation. In this case, the reserved period shall be beforehand memorized by CPU28. CPU28 initializes the bridge system 20 (S12). Then, CPU28 waits to push Out switch 22 (S13a). When Out switch 22 is pushed, it progresses to the processing after Step S14.

[0068]When Out switch 22 is not pushed, it waits to push Out switch 22. If it goes to read the timer 37 in the meantime and the time of the timer 37 becomes a reserved period, CPU28 will detect that and will make the internal switch 35 one (S13). As a result, a power supply comes to be supplied to the enternal memory unit 10. Simultaneously, LED5 is turned on (S15). Then, CPU28 performs bridge operation using SCSI controller 26 and USB controller 27, and makes the personal computer 1 and the enternal memory unit 10 communicate well (S16).
[0069]Next, after bridge operation is completed, CPU28 confirms whether Out switch 22 was pushed (S17a). In this case, CPU28 memorizes the time which had the last access from the personal computer 1. When Out switch 22 is pushed, it goes into post-processing (S18). When Out switch 22 is not pushed, it is confirmed whether those without access from the personal computer 1 passed for 15 minutes (S17b). CPU28 goes to read the time information of the timer 37, and the passage of time for these 15 minutes is counted by deducting time with the last access from said personal computer 1.
[0070]When those without access from the personal computer 1 pass for 15 minutes, it goes into post-processing (S18). When those without access from the personal computer 1 do not pass for 15 minutes, CPU28 confirms whether those without a removable media (it abbreviates to media below) passed for 5 minutes (S17c). In this case, CPU28 will not go to read the timer 37, if media are inserted. And if media are drawn out, CPU28 will go to read the timer 37 and will memorize the time at that time. And if those without media pass for 5 minutes, it will go into post-processing (S18). The sequence of post-processing is completely the same as that of what was shown in drawing 2. The connection from ** of a figure and ** also corresponds with the sequence of post-processing of drawing 2.
[0071]According to this example of an embodiment, it can cooperate with the backup program of the personal computer 1, and automatic backup can be performed. Drawing 9 is a flow chart which shows the 5th example of this invention of operation. It enables it to perform OFF control of the power supply of an external storage from an external device (for example, personal computer) in this example of an embodiment. The figure shows post-processing and is the same as that of what mentioned post-processing already. In an old invention, although the control device (CPU) 28 had published the command of the spin down, by this invention, it is made to publish the command of a spin down from the external device (for example, personal computer) side. The personal computer side also directs permission of power OFF. Drawing 1 is used as a system configuration.
[0072]If it goes into post-processing (S20), it will tell having blinked LED5 and having gone into post-processing (S21). If Out switch 22 is pushed, CPU28 will report that the switch was pushed on the personal computer 1 through the 2nd interface (USB interface) (S23).
[0073]It continues bridge operation until CPU28 has directions of power OFF from the personal computer 1 (S24, S25). The personal computer 1 will publish a spin down command to an external storage, if it finishes discharging all the data. If GOOD KONDESHON comes on the contrary from an external storage, it can recognize that all the data was written in nonvolatile memory, and power OFF will be directed to CPU28 of an external storage (S24, S25). CPU28 turns OFF LED5 in response to the directions from the personal computer 1 (S26), releases the internal switch 35, and turns OFF a power supply (S27).
[0074]According to this example of an embodiment, OFF control of a power supply can be performed from an external device (for example, personal computer). In this invention, utiilty software etc. are operated from a personal computer and it does not carry out whether the function of an invention mentioned above is used, or a user chooses or directions of setting out of waiting time can be performed.
[0075]For example, the command which is in said 1st interface (SCSI interface) at the time of a power turn when Out switch 22 is pushed is published, a power supply is turned OFF, immediately after turning OFF a power supply or pushing Out switch 22, if a specific response returns from said enternal memory unit 10 -- a user can direct that selection via said 2nd interface -- it can be made like.
[0076]If constituted in this way, after a specific response returns from the enternal memory unit 10, selection of whether a power supply is turned OFF or to turn OFF a power supply,

immediately after Out switch 22 is pushed can be set up from the personal computer 1, and OFF control of a power supply as occasion demands can be performed.
[0077]At the time of a power turn, when Out switch 22 is pushed, the fixed time check of the thing without the command over said enternal memory unit 10 is carried out from said 2nd interface (USB interface), The command which is in said 1st interface when there is no fixed time is published, When a specific response returns from the enternal memory unit 10, it can make it possible to direct selection of whether a power supply is turned OFF or to turn OFF a power supply, immediately after Out switch 22 is pushed via the 2nd interface.
[0078]If constituted in this way, when there will be no fixed time command in the enternal memory unit 10, After a specific response returns from the enternal memory unit 10, selection and time setting of whether a power supply is turned OFF or to turn OFF a power supply, immediately after Out switch 22 is pushed can be carried out from the personal computer 1, and OFF control of a power supply as occasion demands can be performed.
[0079]When there is no demand to said enternal memory unit 10 in fixed time, it can make it possible to direct selection of whether to turn OFF a power supply, and setting out of fixed time via the 2nd interface from the 2nd interface (USB interface).
[0080]Since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when there is no demand to the enternal memory unit 10 in fixed time if constituted in this way, OFF control of a power supply as occasion demands can be performed.

[0081]The enternal memory unit 10 is a removable media, and when the state where these media are not contained in the enternal memory unit 10 carries out fixed time lapse, it can make it possible to direct selection of whether to turn OFF a power supply via said 2nd interface.
[0082]Since selection and time setting of whether to turn OFF a power supply can be performed from a personal computer when are constituted in this way and the state where the removable media is not contained in the enternal memory unit carries out fixed time lapse, OFF control of a power supply as occasion demands can be performed.
[0083]It can make it possible to direct setting out of the regular time via said 2nd interface. If constituted in this way, setting out of the regular time can be directed from a personal computer, and on-off control of a power supply as occasion demands can be performed.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a block diagram showing the 1st example of an embodiment of this invention.
[Drawing 2]It is a flow chart which shows the 1st example of this invention of operation.
[Drawing 3]It is a block diagram showing the 2nd example of an embodiment of this invention.
[Drawing 4]It is a figure showing the example of composition of an Out switch.
[Drawing 5]It is a block diagram showing the 3rd example of an embodiment of this invention.
[Drawing 6]It is a flow chart which shows the 2nd example of this invention of operation.
[Drawing 7]It is a flow chart which shows the 3rd example of this invention of operation.
[Drawing 8]It is a flow chart which shows the 4th example of this invention of operation.
[Drawing 9]It is a flow chart which shows the 5th example of this invention of operation.
[Drawing 10]It is a figure showing a personal computer and an external storage.
[Drawing 11]It is a figure showing the example of appearance composition of USB or an external storage with an IEEE1394 interface.
[Drawing 12]It is a block diagram showing the example of the conventional composition of USB or an external storage with an IEEE1394 interface.
[Description of Notations]
1 Personal computer
4 Power supply
5 LED
10 Enternal memory unit
20 Bridge system
21 Power supply jack
22 Out switch
23 Connector
24 SCSI interface
25 Cable
26 SCSI controller
27 USB controller
28 Control device (CPU)
29 The power supply for bridges
30 Data bus
31 and 32 Connector
35 Internal switch
36 Power supply line

[Translation done.]

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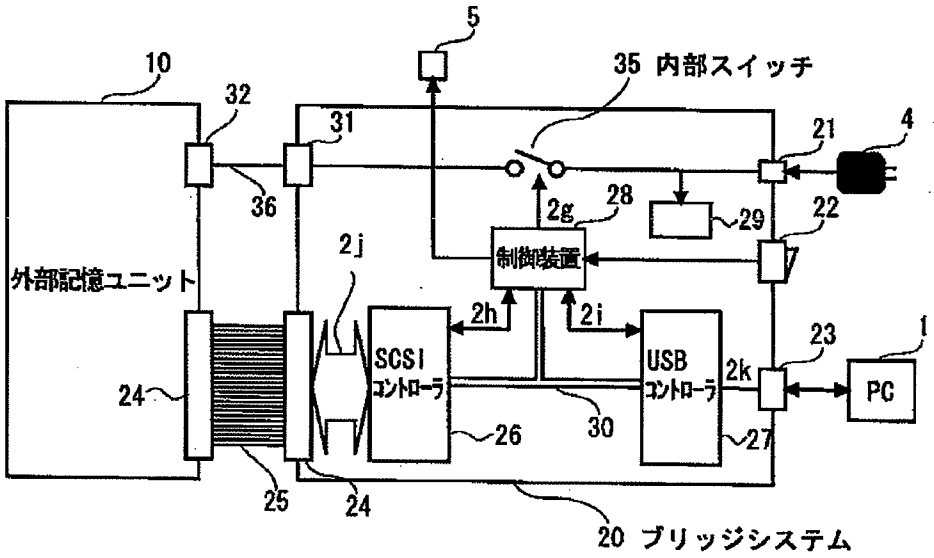
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

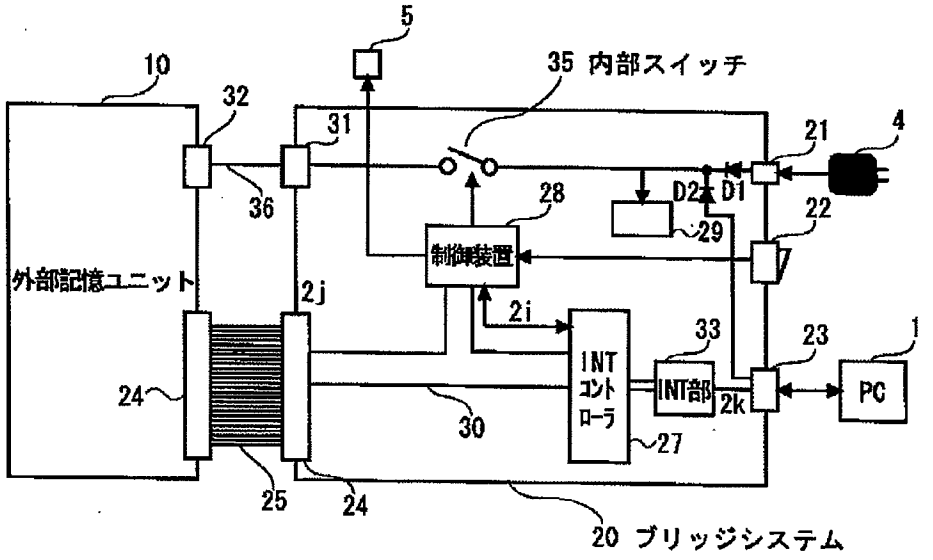
[Drawing 1]

本発明の第１の実施の形態例を示すブロック図

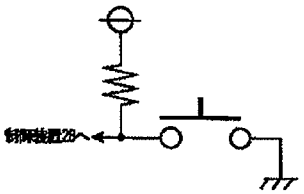


[Drawing 3]

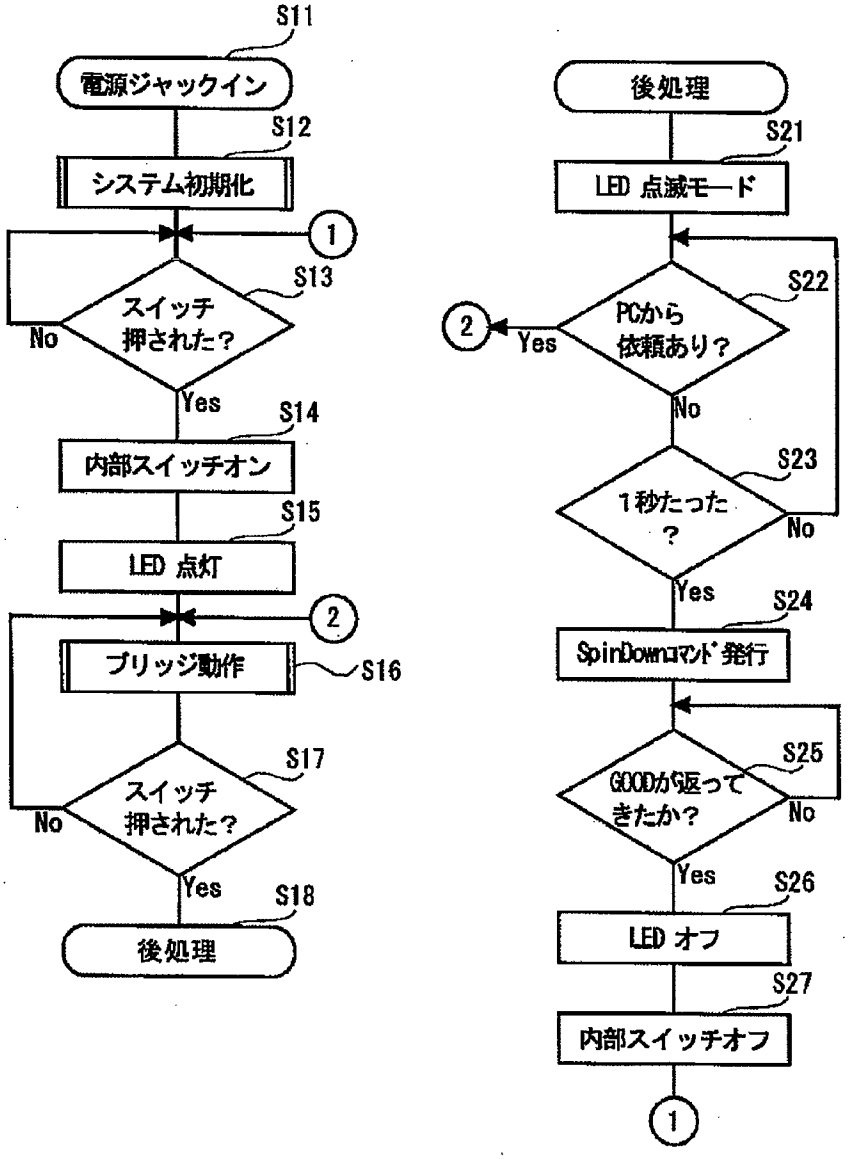
本発明の第２の実施の形態例を示すブロック図



[Drawing 4]
外部スイッチの構成例を示す図

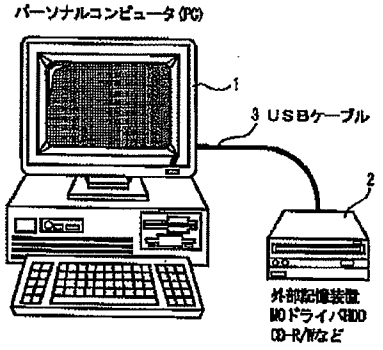


[Drawing 2]
本発明の第１の動作例を示すフローチャート



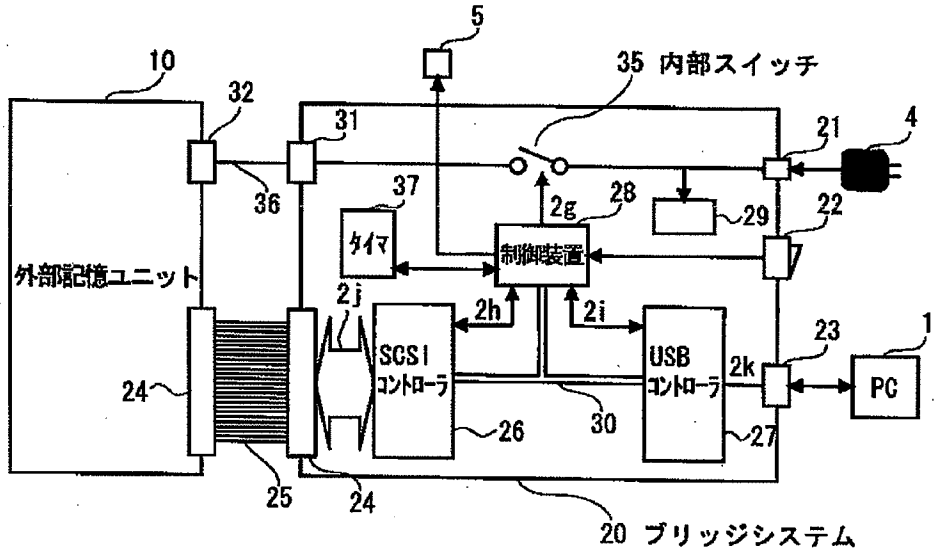
[Drawing 10]

パソコンと外部記憶装置を示す図



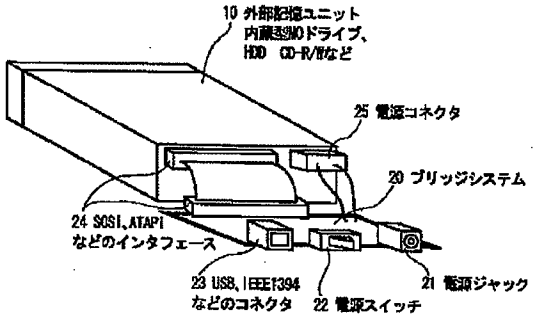
[Drawing 5]

本発明の第３の実施の形態例を示すブロック図



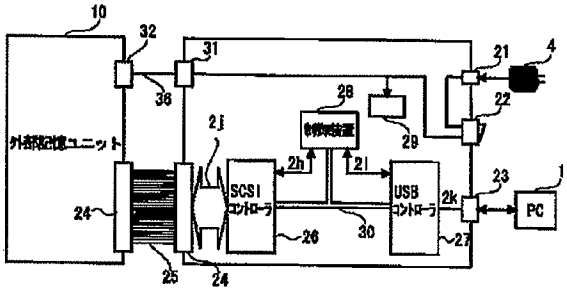
[Drawing 11]

ＵＳＢ又はＩＥＥＥ１３９４インタフェース付外部記憶装置の外観構成例を示す図



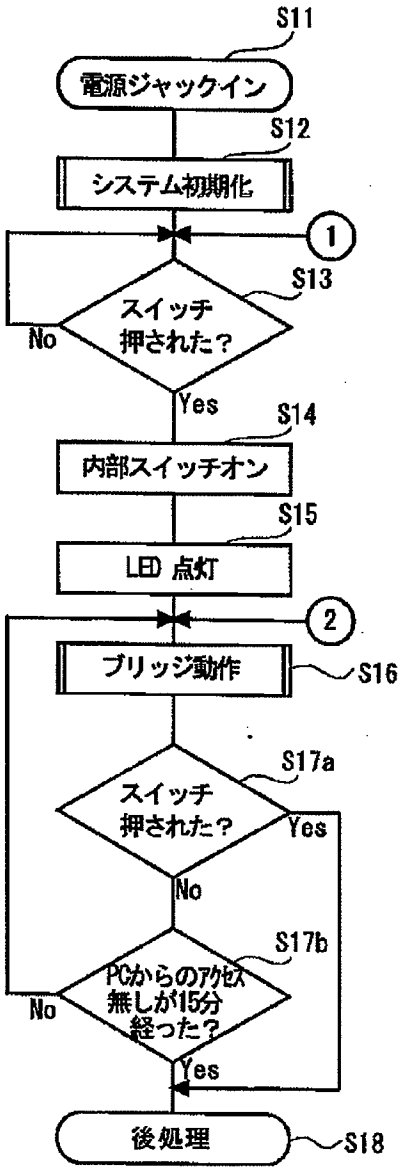
[Drawing 12]

ＵＳＢ又はＩＥＥＥ１３９４インタフェース付外部記憶装置の従来構成例を示すブロック図



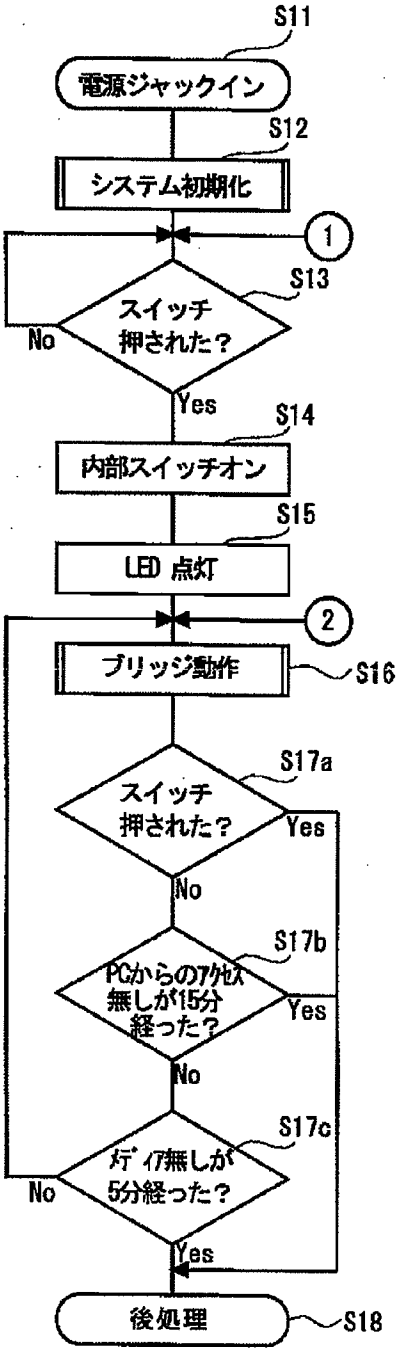
[Drawing 6]

本発明の第２の動作例を示すフローチャート



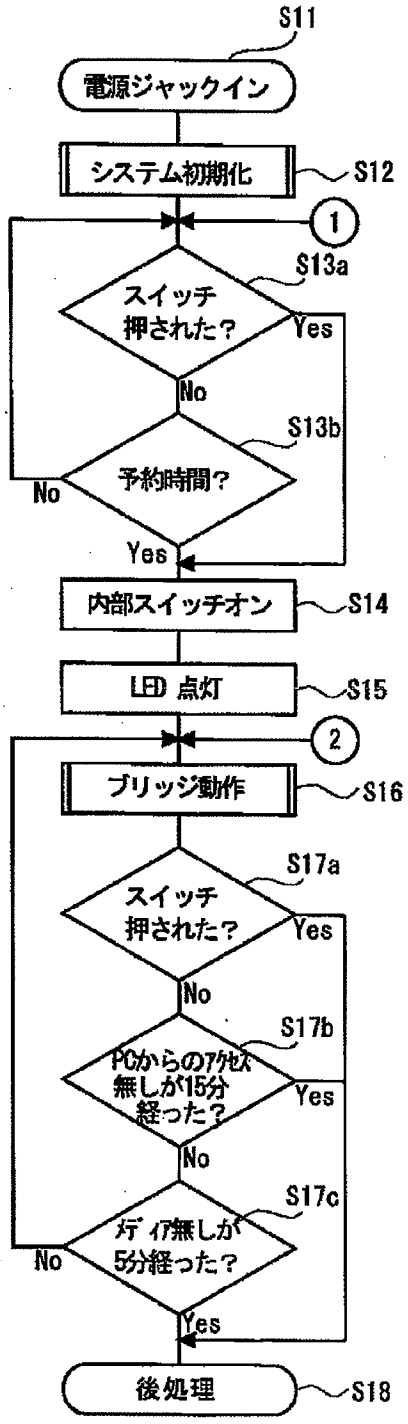
[Drawing 7]

本発明の第３の動作例を示すフローチャート



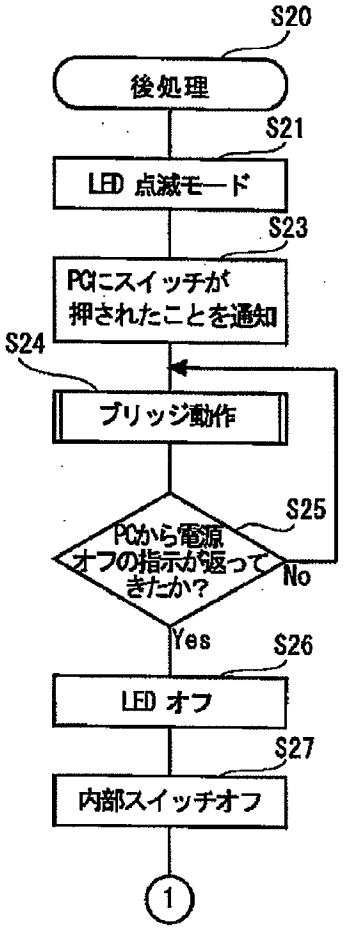
[Drawing 8]

本発明の第３の動作例を示すフローチャート



[Drawing 9]

本発明の第５の動作例を示すフローチャート



[Translation done.]